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TWENTY-FIFTH YEAR

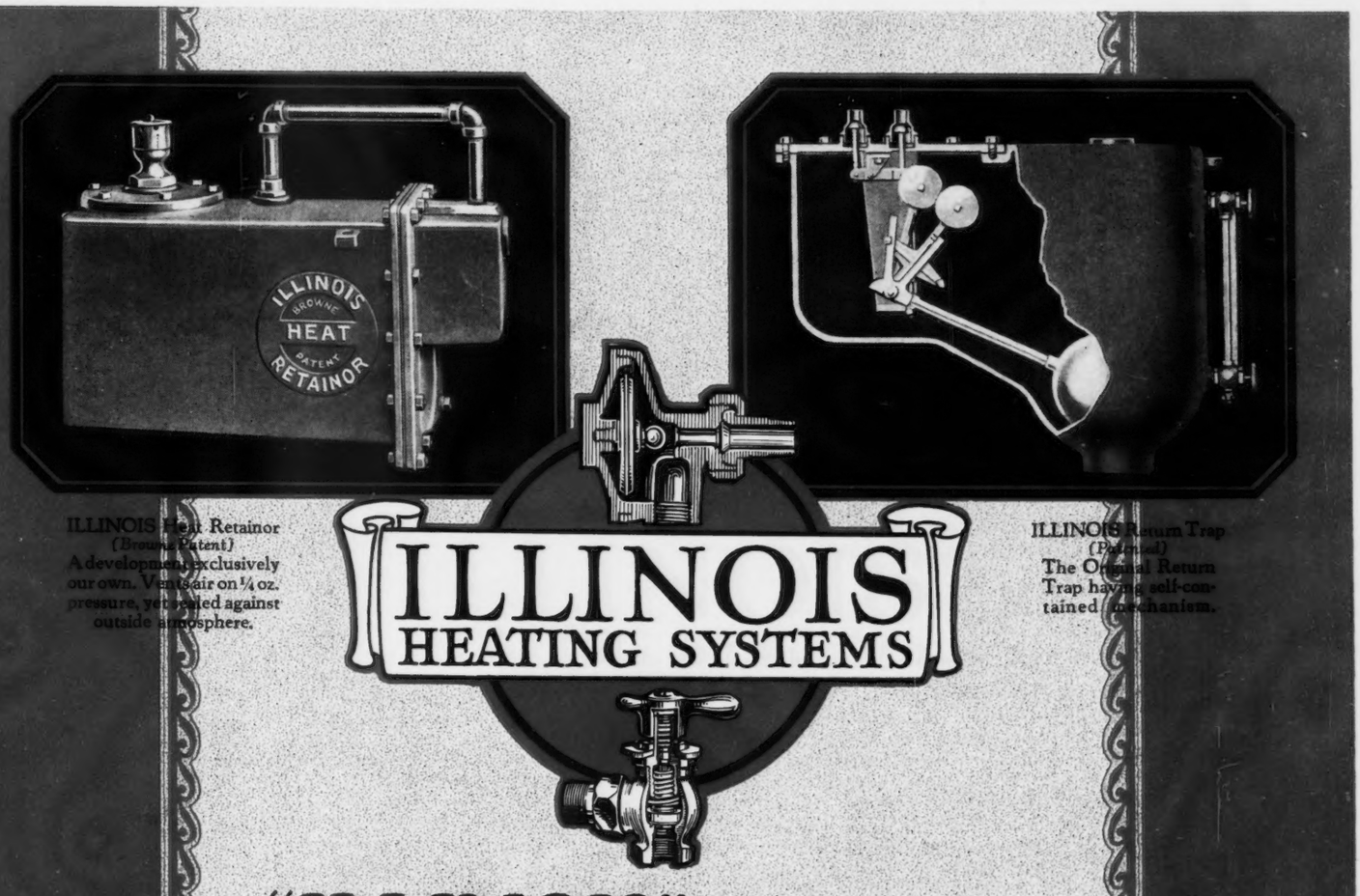
The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

Vol. XXV. No. 4.
$2.00 a year. 30 cents a copy.

APRIL, 1928

Heating & Ventilating Magazine Co.
386 Fourth Avenue, New York.



ILLINOIS Heat Retainor
(Browne Patent)
A development exclusively our own. Vents air on ¼ oz. pressure, yet sealed against outside atmosphere.

ILLINOIS Return Trap
(Patented)
The Original Return Trap having self-contained mechanism.

ILLINOIS
HEATING SYSTEMS

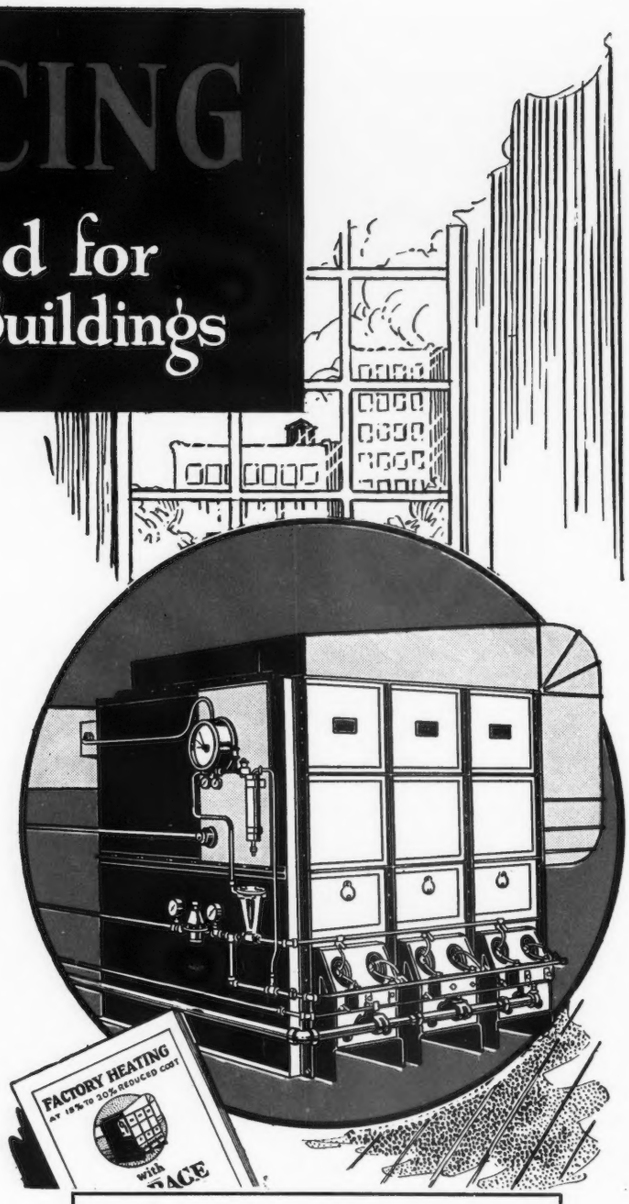
"ILLINOIS" *The Original*
VAPOR HEATING SYSTEM
[circulation at pressures below atmosphere]
• • • *Pioneers* in the prevention of overheating • • • *First* to use "dual trap control" a Return Trap and Air Venting Trap • • • ILLINOIS Heating Systems embody the refinements and developments suggested by long experience. Truly they may be called *the* standard of excellence in modern heating.

Write for "Vapor Details" Bulletin 22

ILLINOIS ENGINEERING COMPANY
ROBT. L. GIFFORD, PRES. INCORPORATED 1900
BRANCHES AND REPRESENTATIVES IN 40 CITIES
CHICAGO

ANNOUNCING

A better Method for Heating Industrial Buildings



THE factory heated by *Clarage McCann Harrison Heaters requires no boiler plant, no stack, no supply and return lines, no pumps, and no steam or hot water radiators. There is no coal to handle; no ashes to remove.

This new industrial heating equipment is direct fired, burning either oil or gas. It delivers warm air under thermostatic control . . . . operation entirely automatic . . . . approved by National Board of Fire Underwriters.

$35,000 SAVED — A TYPICAL EXAMPLE

Clarage McCann Harrison Heaters have already received widespread recognition. One company saved $35,000 or better than 20% in first cost, and this is typical of the installation savings that are invariably realized.

Operating costs are likewise reduced substantially. They average 15% to 20% less than for any indirect method of heating.

WRITE FOR THIS BOOK ON FACTORY HEATING

Our new book, describing Clarage McCann Harrison Heaters is now ready for distribution. Use the coupon or write us today and a copy will come to your desk promptly.

* Adaptable for heating all types and sizes of buildings, old or new; also for low temperature drying.

Send me your book, "Factory Heating at 15% to 20% Reduced Cost with Clarage McCann Harrison Heaters."

CHECK BELOW, IF INTERESTED

☐ Without obligation, have one of your sales engineers call.

Name.....

Address.....

CLARAGE FAN COMPANY, Kalamazoo, Michigan

Sales Engineering Offices in 25 Cities

CLARAGE

McCANN HARRISON HEATERS

KEWANEE

Water Heating

GARBAGE BURNERS

By utilizing garbage and rubbish as fuel for heating water, Kewanee Garbage Burners ***turn waste into profit*** — actually making an asset of what would otherwise be a nuisance.

The saving is anywhere from 30 to 50% of the fuel cost, where a tank heater of the ordinary kind is used for heating water.

Made in three types and fourteen sizes to heat 200 to 2600 gallons of water per hour

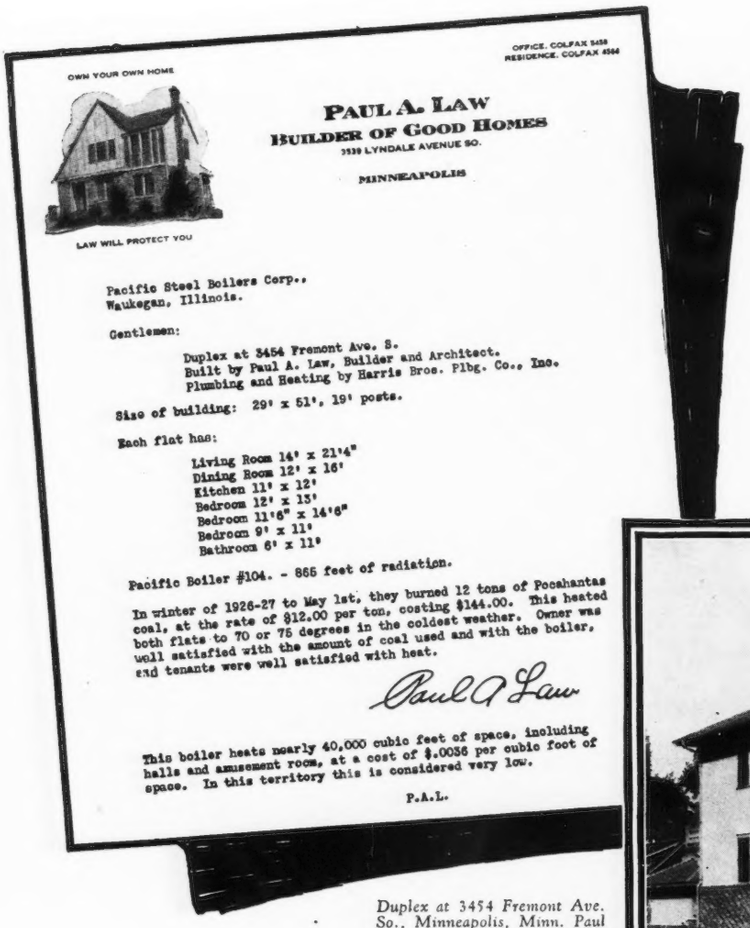
All the details are in Catalog Number 75. Have you a copy?

KEWANEE BOILER CORPORATION

Kewanee, Illinois ***Branches in Most Leading Cities***

STEEL HEATING BOILERS RADIATORS WATER HEATERS TANKS AND WATER HEATING GARBAGE BURNERS

THE HEATING AND VENTILATING MAGAZINE, published by THE HEATING AND VENTILATING MAGAZINE CO., at 386 Fourth Avenue, New York, N. Y. Subscription rates: United States, $2.00; Canada, $2.50; Foreign, $3.00. Single copies, 30 cents. Vol. XXV, No. 4, April, 1928. Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.



OWN YOUR OWN HOME

OFFICE. COLFAX 5458
RESIDENCE. COLFAX 4544

PAUL A. LAW
BUILDER OF GOOD HOMES
3539 LYNDALE AVENUE SO.
MINNEAPOLIS

LAW WILL PROTECT YOU

Pacific Steel Boilers Corp.,
Waukegan, Illinois.

Gentlemen:

Duplex at 3454 Fremont Ave. S.
Built by Paul A. Law, Builder and Architect.
Plumbing and Heating by Harris Bros. Plbg. Co., Inc.

Size of building: 29' x 51', 19' posts.

Each flat has:

Living Room 14' x 21'4"
Dining Room 12' x 16'
Kitchen 11' x 12'
Bedroom 12' x 13'
Bedroom 11'6" x 14'8"
Bedroom 9' x 11'
Bathroom 6' x 11'

Pacific Boiler #104. - 865 feet of radiation.

In winter of 1926-27 to May 1st, they burned 12 tons of Pocahantas coal, at the rate of $12.00 per ton, costing $144.00. This heated both flats to 70 or 75 degrees in the coldest weather. Owner was well satisfied with the amount of coal used and with the boiler, and tenants were well satisfied with heat.

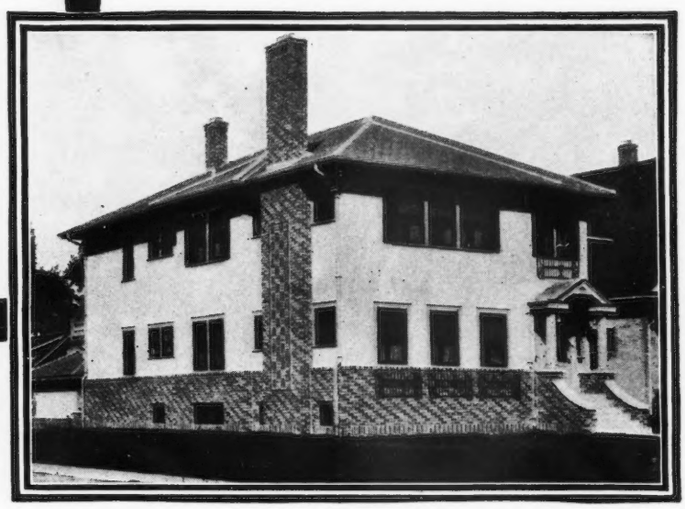
Paul A Law

This boiler heats nearly 40,000 cubic feet of space, including halls and amusement room, at a cost of $.0036 per cubic foot of space. In this territory this is considered very low.

P.A.L.

$144.00

An Entire Season's Heating Cost for This Duplex . . . in Minnesota!



Duplex at 3454 Fremont Ave. So., Minneapolis, Minn. Paul A. Law, Architect and Builder. Harris Bros. Inc., Heating Contractors. One No. 104 Pacific Steel Residence Boiler installed.

Compare This Heating Cost With the Cost of Operating Other Boilers

Heating load: 540 sq. ft. equivalent C. I. steam radiation.

Fuel used (1926-27 heating season): 12 tons Pocohontas at $12 per ton.

Cost of heating per square foot radiation: 26.7 cents per year.

Cost of heating per degree temperature difference: .0064 cents per year per square foot radiation.

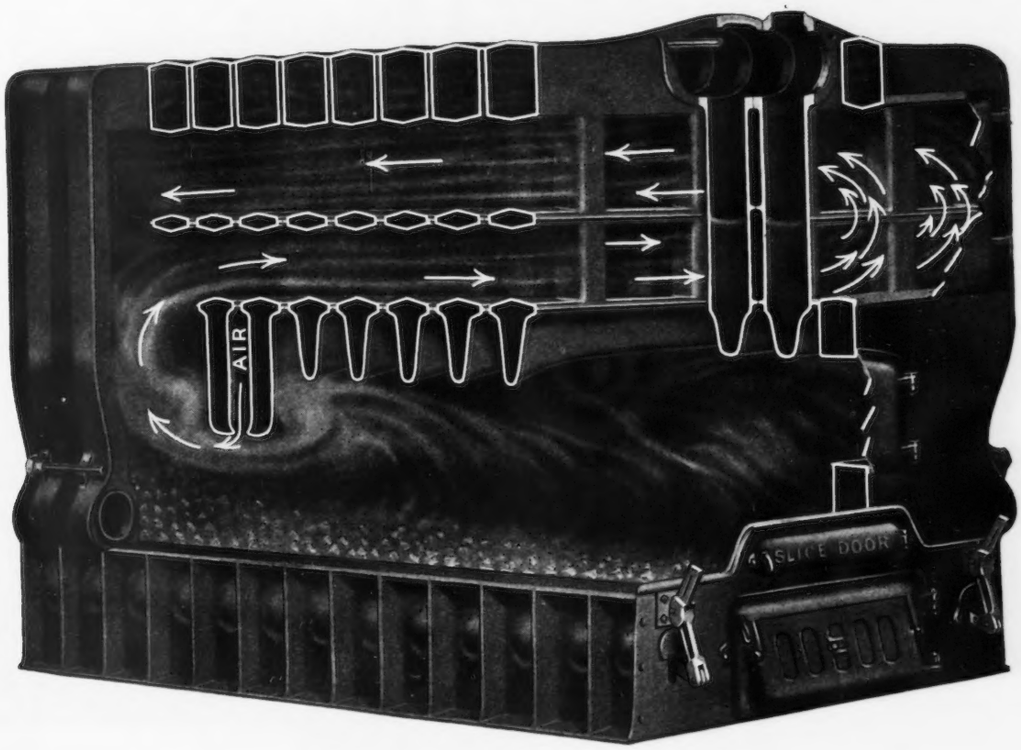
Two facts make the showing of this Pacific Residence Boiler unusually impressive: The large size of the space heated, and the location in the severe climate of Minnesota.

Note carefully the builder's letter describing this building: six rooms and bath in each of the two apartments, plus a hall and amusement room — 40,000 cubic feet of space, heated for $144.00 through an entire season! No wonder the owner was pleased, when his tenants were "well satisfied" with heat provided at this low cost.

Here as in every section of the country, Pacific Boilers are establishing remarkable performance records in *actual operation*—with complete freedom from leaks and interruptions of service, insured by Pacific construction of electric arc welded steel. Write for catalog.

PACIFIC
STEEL RESIDENCE BOILERS

Factories ~~ WAUKEGAN, ILLINOIS ~~ BRISTOL, PA.



Page Smokeless Is Fuel Saving and Law Abiding

Illustrated is the 40″ Monarch Smokeless Boiler, showing three-way fire travel, auxiliary air inductor, and primary and secondary combustion chambers, recommended when it is desired to burn soft coal, or to install a boiler in which soft coal may be burned in the event of a shortage of hard coal.

This Smokeless construction, by means of a device, simple but correct in principle, for the admission of auxiliary air over the fire, will burn the cheapest grades of soft coal without smoke, complying with the most rigid smoke ordinances, and effecting savings as high as 33-1/3%, as compared with soft coal consumption in boilers of the usual type, this without the skilled care and excessive attention required in other boilers.

The Monarch Smokeless Boiler is but one of a most complete line of Page Boilers, for every heating need. Send for 1928 Catalogue, and profit yielding prices.

THE WM. H. PAGE BOILER COMPANY

Makers of a Complete Line of Round and Square Steam and Hot Water Boilers

General Offices: 200 Madison Ave., New York

Branch Offices and Warehouses: BOSTON, 123 Beverly St.; CLEVELAND, Rose Bldg.; PHILADELPHIA, 1126 Washington Ave.
BROOKLYN, 98-49th St. Factory: MEADVILLE, PENNSYLVANIA.

CLARK BUILDING, PITTSBURGH
Arch. and Eng., Hoffman-Henon Co. Htg. Cont., Geo. H. Soffel Co. (Aero Radiation)

NATIONAL PROVIDES THE 3 THINGS YOU WANT

~A COMPLETE LINE
~COMPETENT SERVICE
~UNIT RESPONSIBILITY

You want a line comprehensive enough to fill any heating need. National provides it. National offers equipment and demonstrated dependability. National points to performance over a period of many years on heating applications of every character.

You want service in its broadest sense. National renders it, through its tremendous plant capacity—its strategically located district offices—its vast distributing system.

You want a responsibility that does not quibble or compromise. National accepts it. National, today, offers the resources of six long-established boiler and radiator companies—individually and in combination. It is NOW a united responsibility.

The three things you need most are all assured when your heating requirements are left to the National.

NATIONAL RADIATOR CORPORATION

Ten Plants devoted to National Service through these Branch Offices and Warehouses:
Baltimore, Md.—2622 Frisby Street; Boston, Mass.—93-97 Oliver Street; Buffalo, N. Y.—McKinley Building, Delaware Avenue; Chicago, Ill.—2445 N. Keeler Avenue; Cleveland, Ohio—935 E. 63rd Street; Cincinnati, Ohio—Spring Grove and Elmira Avenue; Indianapolis, Ind.—57 S. Bolton Avenue; New York, N. Y.—55 W. 42nd Street; Johnstown, Pa.—221 Central Avenue; Philadelphia, Pa.—121 N. Broad Street; Pittsburgh, Pa.—1509 Arrott Building; Richmond, Va.—3032 Norfolk Street; Washington, D. C.—2205 Fifth Street, N. E.

THE lowest cost heat you can buy

... saves money for owners, makes money for you

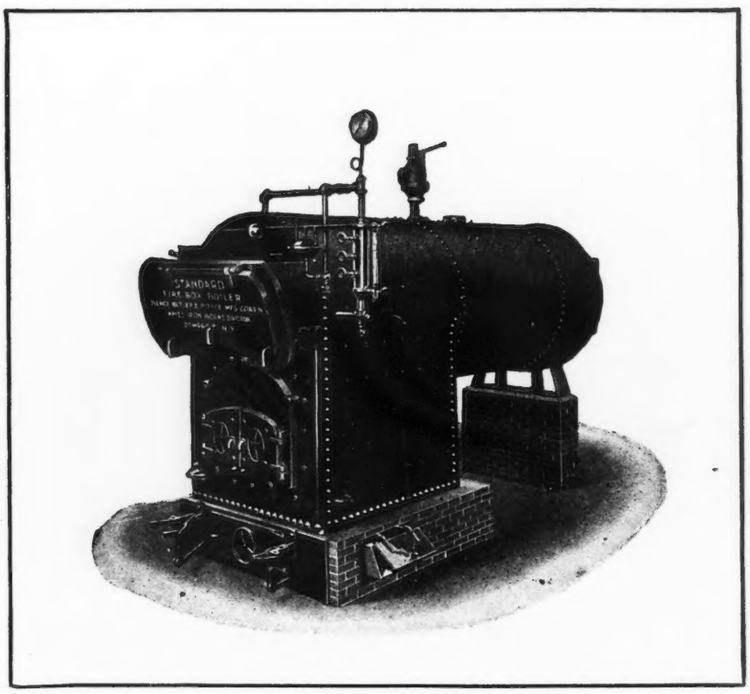
You can show any home owner or builder how Spencer Heaters quickly pay for themselves. They are especially designed to burn No. 1 Buckwheat anthracite which costs an average of $7 less per ton than the domestic sizes. You have an added sales feature—the magazine feed that gives more even heat with 12 to 24 hour firing periods—home owners are glad to pay the slight additional cost of a Spencer for its economy alone. That "slight additional cost" means larger sales and more profit for you.

Spencer
steam, vapor or hot water
Heaters
burn No. 1 Buckwheat Coal

SPENCER HEATER COMPANY *General Offices:* WILLIAMSPORT, PA.
New York City Boston Philadelphia Baltimore Buffalo Rochester Hartford Albany Syracuse Scranton
Division of Lycoming Manufacturing Company

STEAM CAPACITIES:—Cast Iron Sectional *from 600 feet to 3,200 feet.* Steel Tubular *from 2,000 feet to 16,000 feet*

AMES



FIREBOX HEATING BOILERS

AMES IRON WORKS

Division of

PIERCE, BUTLER & PIERCE
MANUFACTURING CORPORATION

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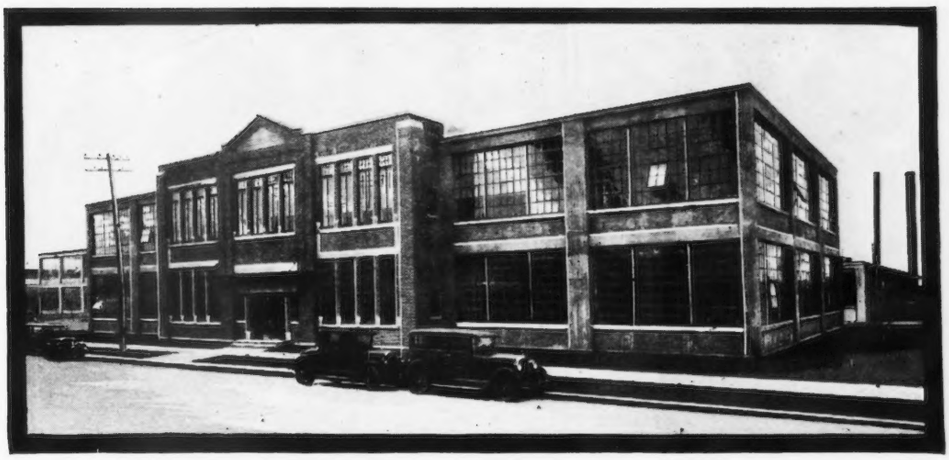
General Sales Offices
41 EAST 42nd STREET, NEW YORK CITY



MORSE CHAIN COMPANY
OF DETROIT

use three

TITUSVILLE *Perfection* *Smokeless* BOILERS

¶ Once a Titusville Boiler user—always a Titusville customer—that is the invariable rule among thousands of Titusville Boiler users all over the Country.

¶ A typical illustration is that of the well known Morse Chain Company of Detroit who have just ordered another Perfection Smokeless Boiler after their very satisfactory experience with two Perfection Boilers installed several years ago.

¶ Do you have our Bulletins?

THE TITUSVILLE IRON WORKS COMPANY
TITUSVILLE, PENNA.

Sales Offices:
New York—152 W. 42nd Street
Chicago, Ill.—111 W. Monroe Street
Detroit, Mich.—204 Owen Building
Buffalo, N. Y.—Marine Trust Building
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Sales Offices:
Pittsburgh, Pa.—Farmers Bank Building
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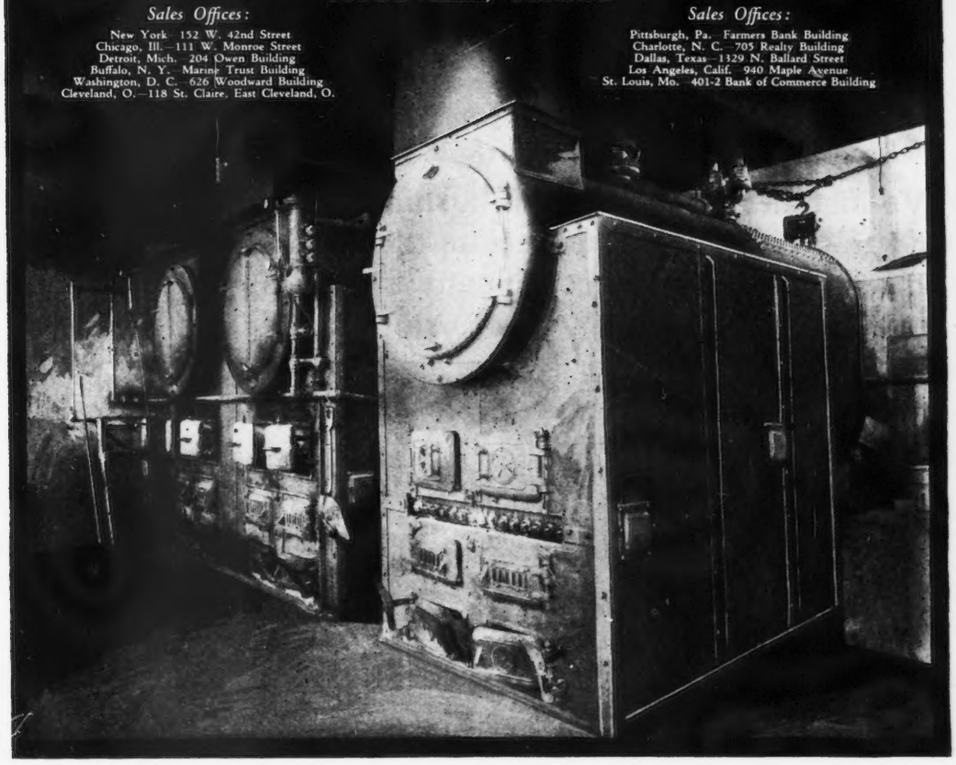
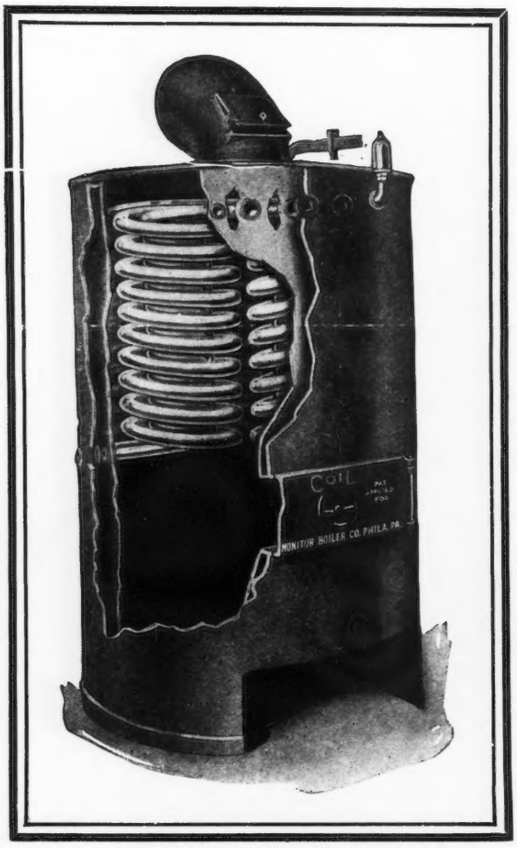
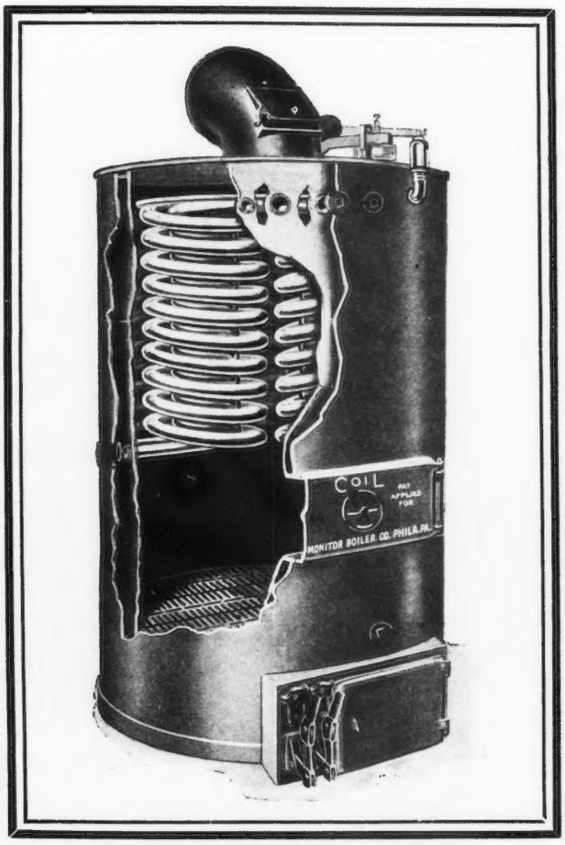
Dallas, Texas—1329 N. Ballard Street
Los Angeles, Calif.—940 Maple Avenue
St. Louis, Mo.—401-2 Bank of Commerce Building





OIL BURNING BOILER



COAL BURNING BOILER

COIL

STEEL HEATING BOILERS AND WATER HEATERS

FOR OIL OR COAL FUEL

The following letter received from W. J. Hickmott, Jr., Pres. Hartford Oil Service, Inc., Hartford, Conn., is self explanatory:

"We installed one of your oil-burning boilers in our twelve-car garage. You can appreciate that with trucks going in and out of the garage continually, the temperature varies greatly. However, the boiler is so efficient that the operation of the oil burner for a very few minutes quickly raises the temperature of the garage to the desired degree."

Write for Catalogue

MONITOR BOILER COMPANY

1505 Race Street PHILADELPHIA, PA.

UNEXCELLED for Any Installation!

PLANTAGENET APARTMENTS

East Orange :: :: New Jersey

HAROLD FOSTER CLARK, *Architect.*

THOS. MAGLIOCCO, *Heating Contractor.*

THE NEWER APARTMENTS ARE USING ROSS STEEL BOILERS

Eastern Distributors:

The Ross Boiler Co., Inc.,

101 Park Ave., New York.

The Frost Manufacturing Company

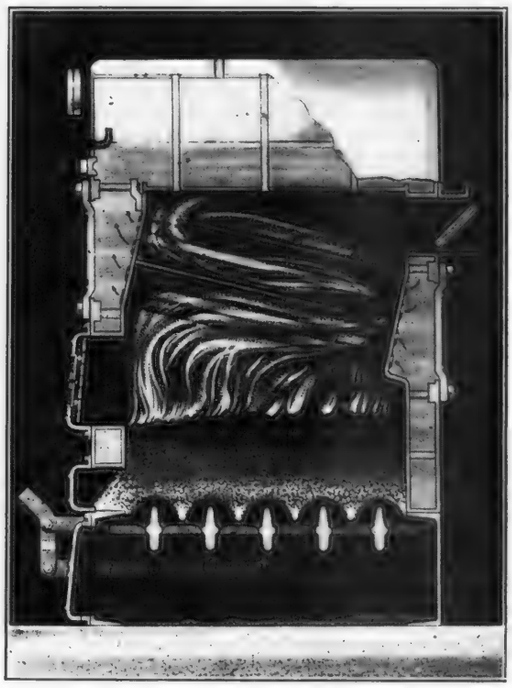
1520 Henderson St., Galesburg, Illinois.

Branches in most leading cities.

ROSS STEEL BOILERS

Specify "KNOWLTON"—
THE COMBINATION BOILER

Coal—Oil—Gas



This boiler compares favorably in efficiency with the best gas-burning boilers, but has the desirable advantage of quick change to coal burning if desired.

Maximum heat transmission throughout its long gas travel and rapid circulation. Result—highest efficiency.

These features guarantee Complete Heating Satisfaction to user and installer. Write us for complete information.

ORR & SEMBOWER, Inc., Reading, Pennsylvania

(Established 1885)

208 N. Clinton St., CHICAGO 50 Church St., NEW YORK

If you turn water into Steam you are a manufacturer

Whether for power or heating purposes the cost of the steam is the cost of boiler, fuel, operation and boiler maintenance.

Refer to your records and find that fuel cost for the first year or year and a half about equals the boiler cost.

Economical production of steam rests first on boiler efficiency and there is no good excuse, under the rules of economical production, for not substituting a boiler of proven efficiency for one which is not making steam for you at the lowest possible cost.

successful manufacturers observe the rules of economical production

The Stanwood Boiler makes more steam per pound of coal because its rapid water circulation absorbs more heat units from combustion.

The low water line necessitates less excavating. Little brick work is required in installation. The Stanwood Boiler has no crown sheets, no circumferential seams exposed to combustion, or mudlegs.

As a first step in more economical steam production costs send for full details of Stanwood Boilers.

For Coal, Oil and Gas

29 to 250 H.P. (3500 to 31,000 sq. ft. steam radiation) 15, 100, 125, 150 lbs. pressure and more.

THE STANWOOD CORPORATION

Manufacturers of Smokeless Boilers, Horizontal Return Tubular Boilers, Stacks, Breechings, Tanks, Feed Water Heaters Throttling and Automatic Steam Engines.

Est. 1891 **CINCINNATI, O.**

"Offices in Principal Cities"

STANWOOD

Smokeless BOILERS

All Steel Riveted Construction

The Stanwood Corporation
Dept. D-48. Cincinnati, O.

You may send full details of the Stanwood Boiler. .....H.P. .....Pressure

Name .....

Address .....

TAYLOR ALLDERDICE HIGH SCHOOL
Architect: Robert Morris Trimble
General Contractors: H. Miller & Sons Co.
Heating Contractors: F. E. Geisler & Company
Plumbing Contractors: Moss & Blakeley Plumbing Co.

Building the High School for Generations to come!

Recent years have brought a marked improvement in our grade and high school buildings. In the march of progress in buildings generally, the high school has undergone practically a complete change in both architectural design and interior plan.

From the modest "school house" of yesterday has come the "institution" of today. Beautiful in outward appearance—efficiently planned within—the modern school building reflects the trend of modern thought in meeting today's needs and anticipating tomorrow's requirements.

In keeping with architectural achievement, engineering skill has been diligently applied—the hand of genius is seen in the specifications for various materials used. Behind the walls and beneath the floors is one of the most important of these materials—a vast net work of pipe lines. There could be no substitute for quality here. Efficient service and long life were factors carefully considered and only pipe which bore unmistakably a reputation for proven quality received consideration.

It is significant that in many of America's modern school buildings "NATIONAL" Pipe has been generously used.

The Taylor Allderdice High School in Pittsburgh illustrated above is one of the many schools throughout the country in which "NATIONAL" Pipe has been installed.

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

DISTRICT SALES OFFICES IN THE LARGER CITIES

"NATIONAL"

Rebels

COLD WAVE CLOSES TEN SCHOOLS HERE; 2 FREEZE TO DEATH

Inquiry Into Failure of Heating Plants Ordered — 3000 Pupils Affected

ICE DELAYS MANY TRAINS; 10 BELOW AT ROCKTON, PA.

Three thousand public school pupils received an added day of vacation yesterday, when ten schools were closed because of insufficient heat.

In the case of three of the schools, according to Robert M. Peterman, heating and ventilating engineer of the Department of Buildings, the lack of heat was caused by breakdowns in equipment.

The possibility of ...

Philadelphia Public Ledger January 4, 1928

ABOVE: A Coatesville All-Steel Portable Fire Box Heating Boiler. These Boilers being self-contained, require a "minimum amount of labor" for installation. Door Hinge Pins are "adjustable" insuring tightness,—and a special method of bracing crown sheets does away with long staybolts.

"PLAY SAFE" —Use Coatesville Boilers

RELIABILITY is a primary asset of COATESVILLE ALL-STEEL HEATING BOILERS,—they have been "time tried" on Land and Sea and have "never been found wanting." These Boilers are the natural result of over 40 years experience, and are available in Welded Construction for 15 lbs. working pressure,—and in Riveted Construction for 100 lbs. pressure. They are available for burning Anthracite Coal, Bituminous Coal, or Oil Fuel.

Every COATESVILLE HEATING BOILER is made in accordance with the latest A.S.M.E. Code and its construction is supervised by a QUALIFIED INSURANCE INSPECTOR, whose Certificate of Test is furnished with each Boiler.

We would be glad to tell you how COATESVILLE ALL-STEEL HEATING BOILERS are Economically serving others,—and we'll gladly send you BULLETINS Nos. 57 and 62 upon request.

P.S.: Very recent installations of Coatesville Heating Boilers include the following Philadelphia Public Schools — SIMON MUHR, J. T. POWERS, ABIGAL VARE.

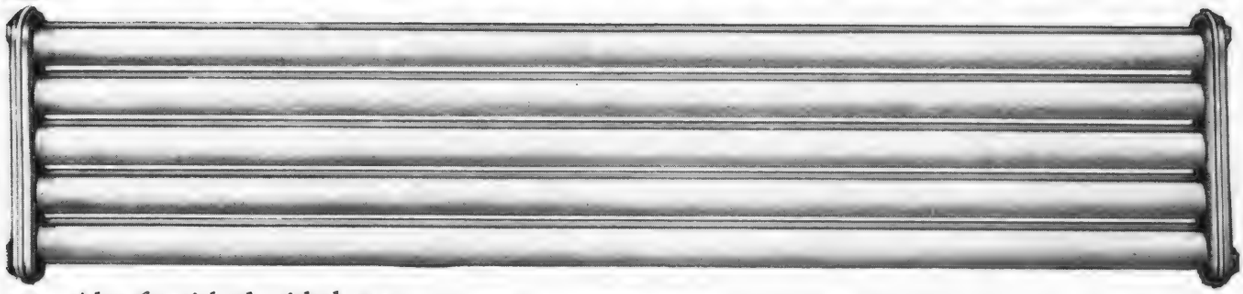
COATESVILLE BOILER WORKS

Boilers - Tanks - Steel Plate Work

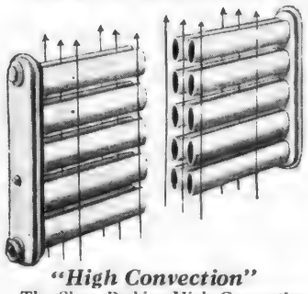
Main Office and Works—COATESVILLE, PA.

Philadelphia	New York	Boston	Pittsburgh	Baltimore
111 S. 15th St.	30 Church St.	141 Milk St.	Union Trust Bldg.	Lexington Bldg.

The Modern Wall Radiator



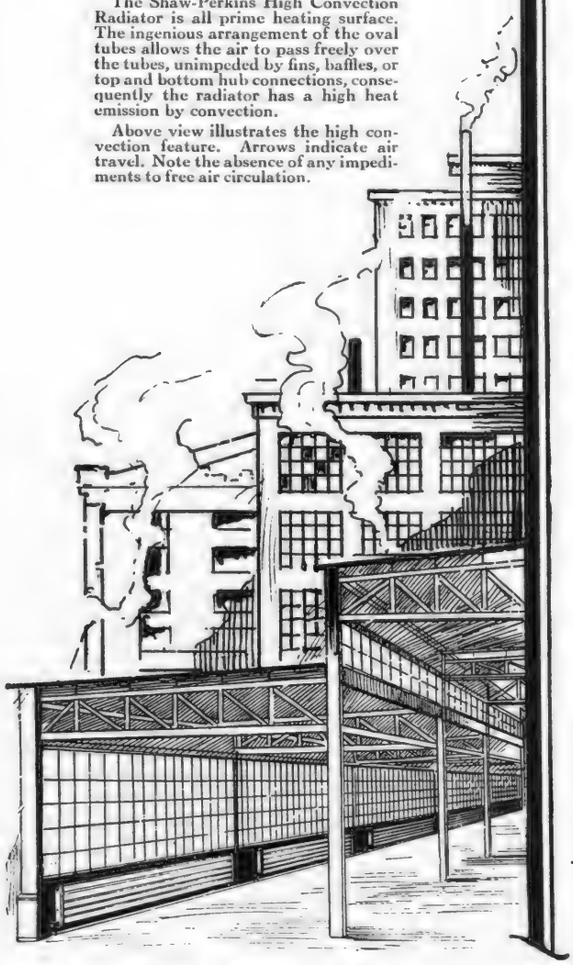
Also furnished with legs for floor installation



"High Convection"

The Shaw-Perkins High Convection Radiator is all prime heating surface. The ingenious arrangement of the oval tubes allows the air to pass freely over the tubes, unimpeded by fins, baffles, or top and bottom hub connections, consequently the radiator has a high heat emission by convection.

Above view illustrates the high convection feature. Arrows indicate air travel. Note the absence of any impediments to free air circulation.



Shaw-Perkins HIGH CONVECTION Radiators

Low Narrow One-Piece Units As Long As 14 Feet

SHAW-PERKINS High Convection Radiators represent an advanced design in Shaw-Perkins standard oval tube radiation, which contains original and valuable features found only in this distinctive type of heating surface.

Light in Weight: The radiators weigh only one third as much as other forms of direct radiation. This absence of useless weight makes the radiators especially practical for suspension upon wall brackets. In comparison with pipe coils or sectional wall radiators, many joints and connections are eliminated and much labor saved by the use of Shaw-Perkins High Convection Radiators.

Heat and Cool Quickly: The light uniform walls of the radiators cause them to respond promptly to the turn of the valve, giving quick and positive control over room temperatures.

Save Space: The radiators save considerable space. While the radiators are built in several heights and numerous lengths up to 14 feet, the space saving is usually taken advantage of in the saving in height and width offered by the low narrow models.

Absolutely Sanitary: The radiators have no rough surfaces or fins to act as dust entanglements. All surfaces of the radiators are smooth and easily accessible for hand wiping.

Unusually Adaptable: The distinctive design and unique dimensions of the radiators make them remarkably suitable for installation upon walls, under windows, in recesses, upon columns, pilasters, etc. They are most desirable for heating Factories, Warehouses, Greenhouses, Garages, Theatres, Churches, Stores, Dwellings, etc. The radiators are also particularly adapted to various drying and cooling purposes and to many industrial uses.

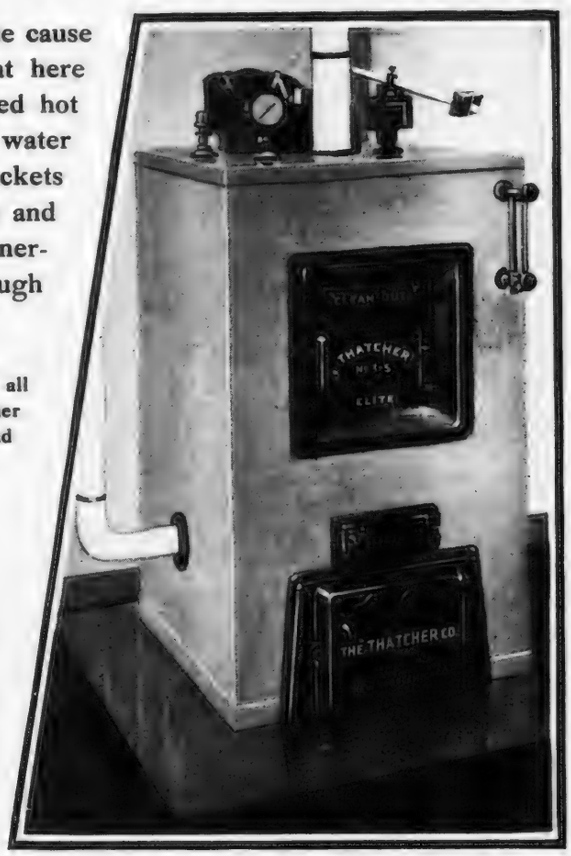
Get the Full Story of this Modern Radiator

SEND FOR CATALOG "H"

Shaw-Perkins Manufacturing Company, Pittsburgh, Pa.

What does *STAGGERED FIRE TRAVEL* mean?

This Thatcher principle in boiler construction has been the cause of much favorable comment—because it is realized that here we have a vital reason for fuel economy. Picture the red hot tongues of flame dashing themselves madly against the water surfaces—the hot gases surging upward through the jackets of boiling water—to be staggered back and forth again and again from surface to surface until almost every atom of generated heat has been utilized. Result—lower fuel cost through greater utilization of the heat units.



THATCHER
STAGGERED FIRE TRAVEL

This "staggered fire travel" principle is a feature of all Thatcher boilers. We illustrate here the new Thatcher "Elite" red enamel jacketed boiler. Full details and descriptions will gladly be sent upon request.

THE THATCHER COMPANY
39-41 St. Francis Street - - Newark, N. J.
New York—21 West 44th Street
Chicago—341 No. Clark Street

THATCHER
Elite ENAMEL JACKETED Boilers
BOILERS - FURNACES - RANGES - RADIATORS

The Three Steps to Perfect Radiation

ROBRAS 20-20 RADIATORS

In the Walls—Under the Window
Out Of The Way

It is really very simple to install a radiator where it will be out of the way. A recess, as shown to the left in the above illustration, is left by mason and carpenter when they finish their part of the work.

You line the recess with galvanized iron. Then you connect up the Robras 20-20 radiator. The sections of this radiator have been assembled at the factory in the lengths and amount of radiation you require. It is ready for you to attach to the existing heat whether it be hot water, steam or vapor.

After the radiator has been set up, a front is fitted on. This is equipped with two grilles, as simple or elaborate as the pocketbook of your customer permits. Then the job is finished. The room has bountiful warmth and there is no radiator in sight or in the way. The air is thrown out into the room where it can't soil the curtains. The valve handle is extended to the window sill, giving easy control. These Robras 20-20's are the height of radiator luxury.

ROME BRASS RADIATOR
CORPORATION

ONE EAST FORTY-SECOND STREET . . . . . NEW YORK

A new booklet on a new feeder

—of vital interest to every heating engineer

You have been waiting for a boiler feeder that would keep the water line where it belongs—that would do this under all conditions of feed water and even in the event of pump or current failure.

Now you have such a feeder—a feeder that will always work right because it is *self-cleaning*—a feeder that has capacity enough to supply the boiler even when there is no return of condensation!

The facts about this new achievement are contained in a new booklet. Briefly, but thoroughly, it shows *why* a duplex feeder is needed, *what* an ideal feeder should do, and *why* the new Self-Cleaning McDonnell & Miller Feeder fulfills this vital need supremely well. The booklet covers design and operation; also shows typical installations and contains an interesting curve on capacities.

Simply mail the coupon for your copy.

McDONNELL & MILLER, 710 Wrigley Bldg., Chicago

With the valves that Stay New

Only the Self-Cleaning McDonnell & Miller has these advantages:

1 *Self-cleaning valves.* Valve discs rotate on seats and grind themselves every time the float moves. They "stay new."

2 *Fully adjustable.* Adjustments are provided for changing water line one inch up or down *after* feeder is installed. Differential between valves can be set at 1, 2, 3, 4 or 5 inches.

3 *Greater capacity.* Full city pressure is delivered directly into feed line.

4 *Unmatched simplicity.* There is only one float and only one moving unit. This unit oscillates (instead of sliding) on two bronze bearings. "No sliding means no sticking."

H 4

McDONNELL & MILLER
SELF-CLEANING
Duplex Feeder

"Doing one thing well"

Coupon Brings Booklet—

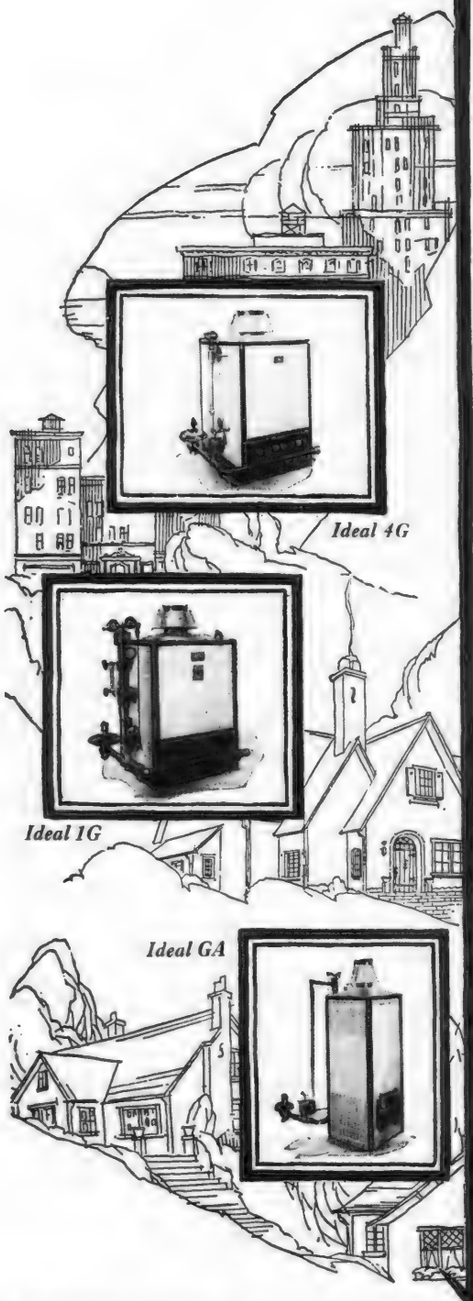
McDonnell & Miller
710 Wrigley Bldg., Chicago

Please send a copy of your new bulletin to:

Name.....

Address.....

Business.....



On almost any heating job, one of these

GAS BOILERS

is cleaner, more convenient and more profitable

to you!

For cottages or bungalows — with or without basements — an Ideal Arcola Gas Heater!

For small or medium-sized homes —Ideal 1G Gas Boiler!

For larger homes and buildings — Ideal 4G Gas Boiler!

For office buildings, big apartment houses, hotels — Ideal 4G Gas Boilers in multiple units

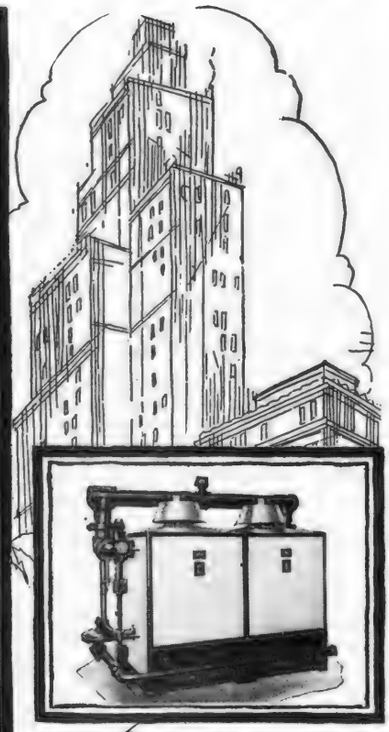
All these boilers are useful for large-volume hot-water supply and industrial applications.

LET your better customers know what it means to live in a house automatically heated by an Ideal Gas Boiler!

More and more gas companies are establishing special rates for heating, and cooperating with contractors. This means a clean net profit for you on every job. The gas company takes care of callbacks and service.

A complete range of boilers for every heating job—from a model cottage to the largest building.

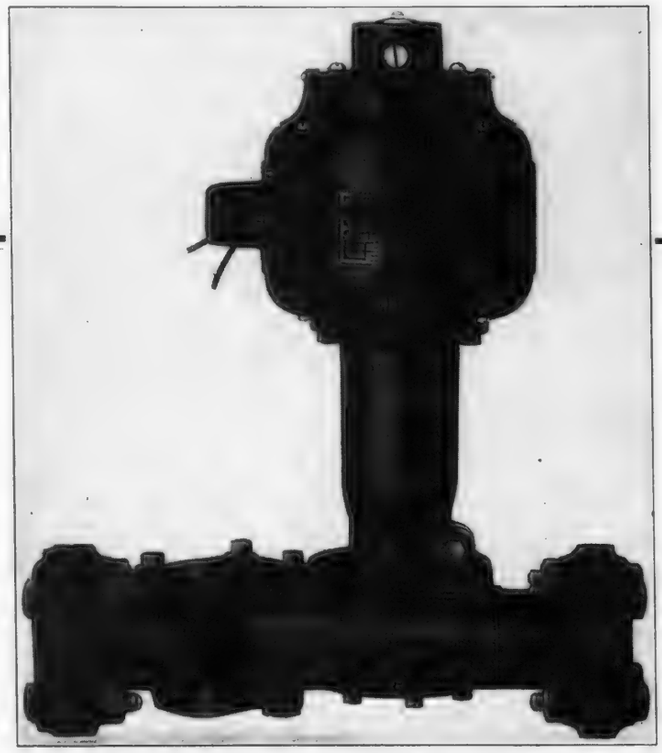
Write for details



IDEAL GAS BOILERS

Product of AMERICAN RADIATOR COMPANY *Gas Utilization Dept.*

Write to AMERICAN GAS PRODUCTS CORPORATION, *Distributors*
376 Lafayette Street, New York City



The HYDROLATOR is connected on the boiler return line. When not in operation, it does not interfere with the normal flow of water. The pump impeller is located *off* the line of normal flow and water is diverted through the impeller only when the HYDROLATOR is running.

Patent Applied For.

Sell Your Customers NEW Heating Comfort and Economy

JANETTE
Motorized Blowers

Designed specially for oil burner use. Janette Motorized Blowers are built as a single unit—motor, fan and housing—in perfect balance. Large volume at low pressure. Operate from any light socket. Require no attention other than oiling once or twice a season. Janette Motor, wool packed bearings, very quiet. Used by over 20 oil burner manufacturers.

Every HYDROLATOR you sell for installation on a hot water system means new heating comfort and economy for your customer. The HYDROLATOR forces more hot water to every radiator—several times more—thus making it easier for your customer to keep his home warm. Water temperatures in all radiators are practically identical—no longer is the radiator on the end of the line starved for heat.

Smaller Fire—Fuel Economy

Water returns to the boiler at only a slightly lower temperature than when it left, thus a smaller fire is required to bring it up to heating temperature. This results in important fuel economies.

The HYDROLATOR also heats homes more quickly. As soon as the HYDROLATOR is turned on, hot water from the boiler is sent through the radiators—a feature that is especially desirable on cold mornings.

Mail Coupon for Prices and Full Information

Janette Manufacturing Company

556-58 W. Monroe St., Chicago

Singer Bldg., 149 Broadway, New York City

Real Estate Trust Bldg., Philadelphia

Harrison Sales Co., Seattle, Portland, Spokane.

H V 4

JANETTE MANUFACTURING CO., 556-58 W. Monroe St., Chicago, Ill.

Please send me prices and full information on:

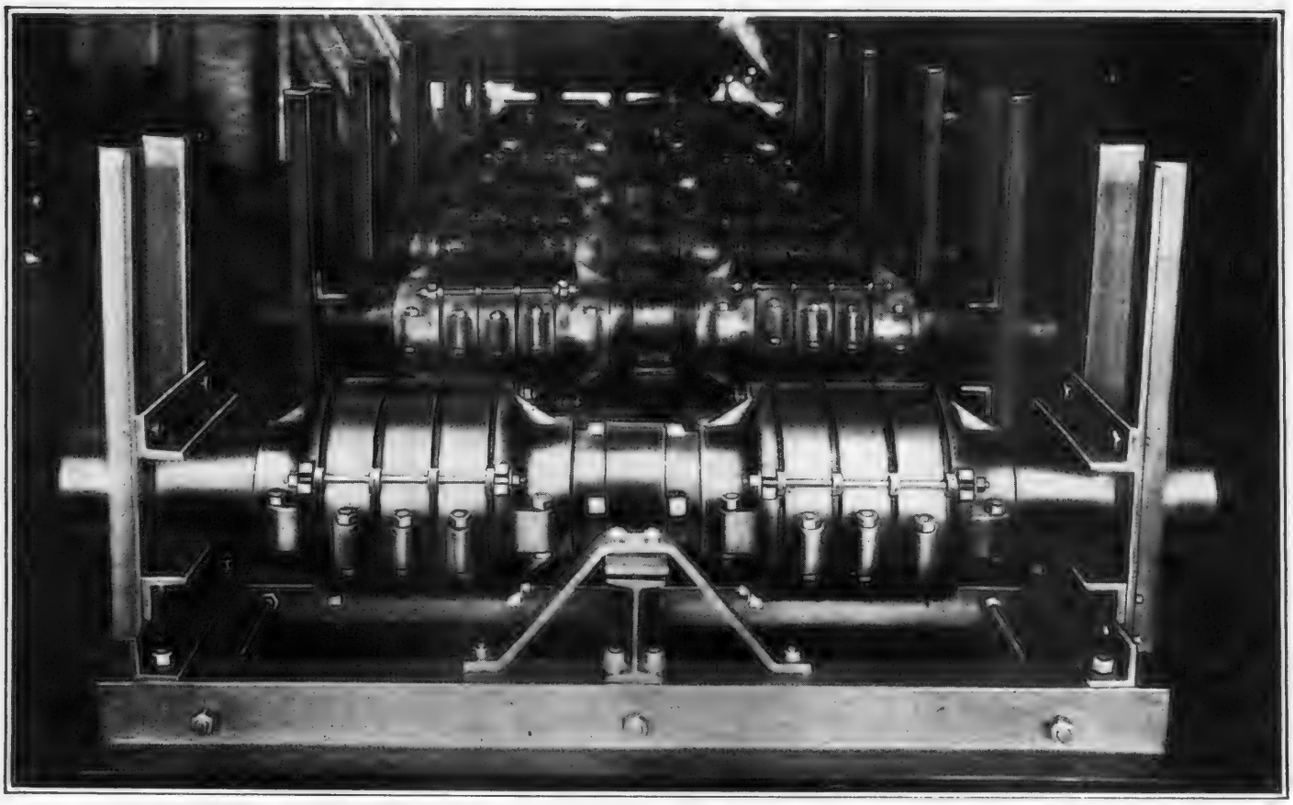
☐ The HYDROLATOR

☐ JANETTE Motorized Blowers

Name .....

Address .....

City ..... State .....



Shipped—Ready to weld into your pipe lines

BADGER

Double Self-Equalizing Flangeless Expansion Units

(complete with anchor and guides)

These flangeless and packless expansion units are mounted on a structural steel base, which supports the anchorage and the angle iron guides for keeping the expansion elements in true alignment. The base may be embedded in concrete or bolted to a concrete foundation block. The open pipe ends are scarfed and ready to be welded into the pipe line.

The deeply corrugated one-piece seamless copper tube expansion elements contract and elongate freely, with the pipe line movement. External equalizing rings distribute the expansion uniformly, among all the corrugations.

Guaranteed for working pressures to 200 lb. Furnished either with or without center service outlet. Can be supplied with Monel Metal internal telescoping sleeves for superheated steam.

Write us for Bulletin.

E. B. BADGER & SONS CO.

75 Pitts Street, BOSTON, MASS.

New York: 271 Madison Ave. Tulsa, Okla.: Mid-Continent Bldg.
Representatives in all principal cities

BADGER Engineering Service **Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products: — Pipe Bends, Chemical Apparatus, Copper and Sheet Metal Work and Copper Boilers.**

BADGER EXPANSION JOINTS

ESTABLISHED 1841 · WEATHER VANE ON FANEUIL HALL · TRADE MARK · E. B. BADGER & SONS COMPANY

TALL towers—fashionable hotels—institutions of all kinds—in fact, countless buildings of the better class throughout the country are heated the McAlear way. McAlear Vapor and Vacuum heating Equipment gives full protection and perfect automatic control. McAlear Equipment operates with unvarying success on oil, gas and coal fired boilers.

The buildings shown here are equipped with McAlear Water Feeders, McAlear Return Traps and Air Eliminators, McAlear Radiator Hangers, and other units of the McAlear Vapor and Vacuum Heating System.

Write for a copy of our fully illustrated 127 page catalogue, describing McAlear equipment in detail.

Dealers:—McAlear offers you an especially attractive proposition. Write for details.

19th and Western

McALEAR

Manufacturing Company

Chicago, Illinois

At right, 6 in. aerial steam line of the Utica Gas and Electric Co., showing two expansion joints in the foreground with methods of anchorage. Harbor Point steam plant in background.

Below, ADSCO casing constructions used in 16 in. welded line of Consumers' Power Company at Grand Rapids, Mich.

Below, underground steam mains in Multicell Tile Conduit — Consumers' Power Company, Saginaw, Mich.

For underground or aerial steam mains, *high or low pressures*

Developed for our own use in *underground* steam lines, an application which demands equipment requiring minimum attention and replacement, ADSCO Specialties are recognized throughout the trade as superior for any purpose where trouble-proof operation is essential.

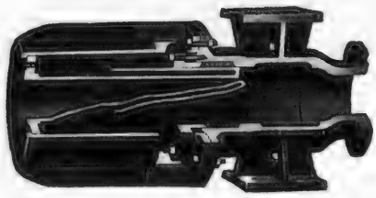
Heating engineers and contractors are invited to send us their blue prints for any steam distribution lines, underground or overhead, high or low pressure. Our Engineers' Service Department will be glad to recommend the equipment best adapted for each installation, and quote prices on whatever ADSCO Specialties are needed.

As the first step towards the more economical distribution of steam, write for literature on ADSCO Specialties, including the ADSCO Blue Book on Expansion, which contains charts for computing the amount of pipe expansion due to varying temperatures—describes and illustrates the complete line of Expansion Devices which ADSCO engineers have developed to meet these conditions.

AMERICAN DISTRICT STEAM COMPANY
GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

ADSCO

EXPANSION JOINTS - CASING - METERS - STEAM TRAPS - REDUCING VALVES - GATE VALVES



ADSCO Duplex-Sleeve Guided Expansion Joint for high pressure and superheat. Air-cooled slip eliminates excessive packing trouble.

ADSCO Nelson Gate Valve for 400 pounds working steam pressure. Completely mounted with non-corrosive metal.

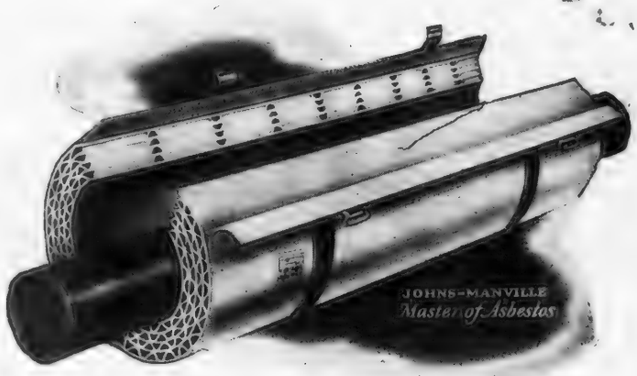
ADSCO Model P Variator for pressures up to 125 pounds.

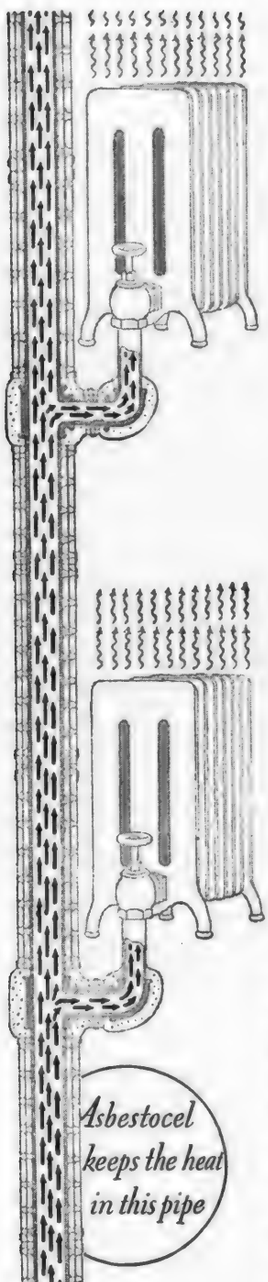
ADSCO Empire Steam Trap for low pressure. Capacity ranges from vacuum to 20 pounds pressure.

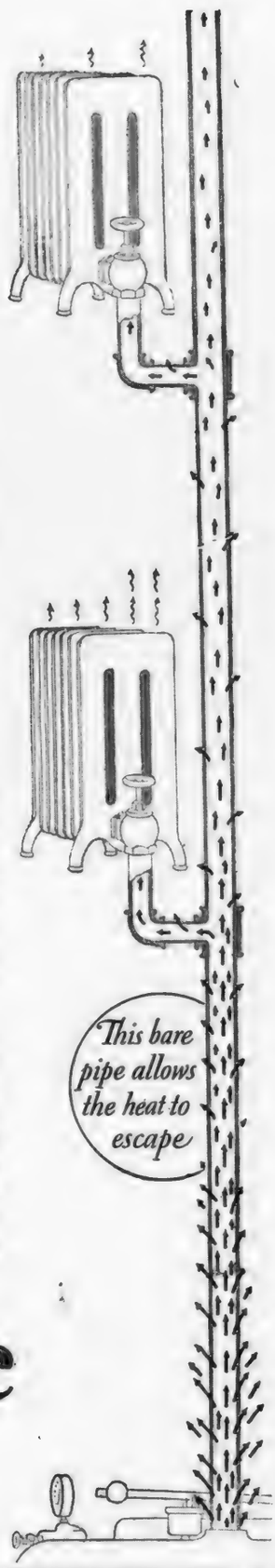
ADSCO Standard Casing Construction utilizing ADSCO (Red Diamond Brand) kiln dried wood casing.

ADSCO Simplex Condensation Meter for metering steam condensation.

Improved ASBESTOCEL *Enhances Your Own Reputation*







Whether it be a five room cottage or a three thousand room hotel, owners want a neat job. The sturdy exact construction of Johns-Manville Improved Asbestocel insures good looking work. Every piece of Asbestocel is standard in all dimensions and symmetrical. Your men can apply Asbestocel more rapidly than any ordinary air cell insulation and every piece of pipe will be a smooth, regular, good looking white cylinder.

This is the sort of work which customers accept without hesitation. Your trade will also be pleased when you tell them that Johns-Manville Asbestocel is fifteen per cent more efficient than ordinary low temperature insulation. Johns-Manville, pioneer developer of Asbestos, makes and guarantees Improved Asbestocel.

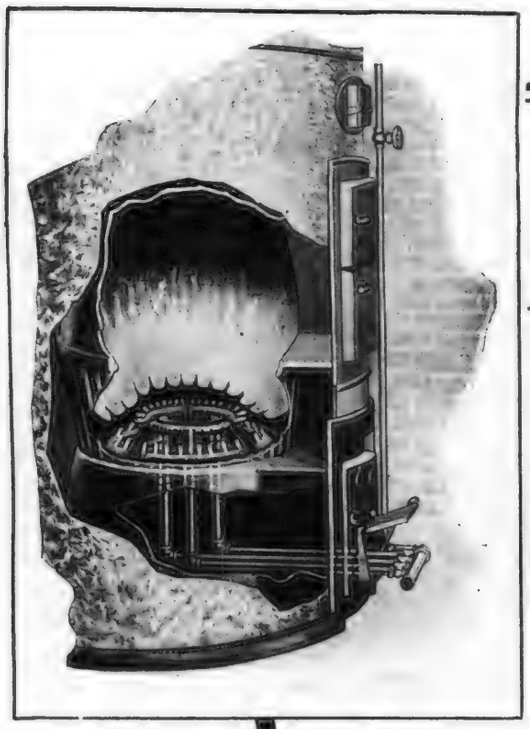
Everyone will accept Johns-Manville Asbestocel and be pleased with it. It is the only nationally advertised, nationally distributed low pressure insulation. You might just as well use the best, and share the advantage of the reputation which Asbestocel enjoys in all parts of the country.

Johns-Manville
Improved Asbestocel

ROOFINGS AND INSULATIONS
OF FIREPROOF ASBESTOS

Full page advertisements using the designs shown here are appearing in the Saturday Evening Post, Collier's, Liberty, Literary Digest, Country Life, Garden & Home Builder, Better Homes & Gardens, Cosmopolitan, House Beautiful and House & Garden, thus helping to make the public familiar with the advantages of Asbestocel.

JOHNS-MANVILLE CORP. A-61-4
New York, Chicago, Cleveland, San Francisco
For Canada:
Canadian Johns-Manville Co., Ltd., Toronto.
Gentlemen:
Send information and prices on Asbestocel to the name and address indicated on the margin below.



Help your customers do it better With Gas

The Coal Bin Is Nearly Empty—Mild Weather Is at Hand—Spring House Cleaning Is the Order of the Day

House heating by gas, makes house cleaning permanent. Everyone appreciates the Comforts, Cleanliness and Convenience of gas heat; its quick response to firing and its really great Economy when all these things are considered.

There is, however, strong objection on the part of many prospective users of gas heat to the cost of an installation of new gas fired equipment. You can turn this objection into big profits by showing how Barber Conversion Burners give the user all the advantages of gas heat with their *present heating plant.*

With BARBER Patented JET GAS BURNERS

Our Engineering Department is always at your service. Just send us the trade name, number and manufacturer's name of the furnace or boiler you wish to Convert to gas. We will promptly specify the correct Barber Burner assembly for it.

Go after this conversion work right now with Barber Burners!

Write us today for your copy of our new Catalog No. 28. It contains a lot of helpful working data and information.

The CLEVELAND GAS BURNER & APPLIANCE CO.
Burner Specialists
3702-04 Superior Avenue, Cleveland, Ohio

NEW THERMO-SWITCHES by CON-TAC-TOR

A FULL line of new Thermoswitches—plain or clock type, two or three wire, high or low voltage, mercury switch contact, thermometer equipped, accurate and dependable—is now presented.

These Thermoswitches will be standard equipment with the Con-Tac-Tor No. 77 Lockswitch System, but are available to provide close temperature regulation in any low wattage circuit (300 watts maximum, 220 volts or less) or can be used in conjunction with the Con-Tac-Tor Magnetic Heavy Duty Relay for almost any burner installation.

Bimetal furnishes the motive power for these new controls, thus eliminating complicated mechanisms and chances for wear in moving parts. The Thermoswitches are accurate. They will maintain the desired temperature within one degree. Prices and trial samples will be sent on request.

Above is shown the No. 135 Thermoswitch, the two wire model, high or low voltage. Note its graceful appearance—how compact it is—how handy is the temperature adjustment. The clock models are equally attractive and are equipped with an 8-day full jewelled movement made by one of the leading clock manufacturers of the country.

Please send me one of your No. 135 Thermoswitches for 90-day trial.

_____

_____

_____

HV 4 28

HAVE YOU A COPY OF OUR NEW CATALOG—BULLETIN 111? IF NOT, WRITE US.

ABSOLUTE CON-TAC-TOR CORPORATION

ELKHART, INDIANA

"I was skeptical when I read your ad"—

AN experienced salesman said, after taking the ABC agency. He did not believe it possible to make from $3,000 to $10,000 a year as an ABC agent.

But we proved to him that our figures are based on facts.

Tell us about yourself and we will tell you our plan. You need only one thing—ambition. Have you got it? Then write us confidentially.

AUTOMATIC BURNER CORPORATION

312 North May Street

Chicago

Again in the Light of the Oil Burner Flame!

Year after year, sales of Hardinge Fuel Oil Burners have shown substantial increase.

In 1927, thanks to the many satisfied users and prosperous dealers, we can point to an increase of more than 30% over 1926.

Hardinge Brothers, Inc.
Factory and General Offices:
4149 Ravenswood Ave., Chicago
Factory Branches:
Chicago, Michigan Ave. at Ohio St.
Boston, 839 Beacon St.

First the 10-year guarantee —the Hardinge really lasts a lifetime—and now—

Every Hardinge oil burner is guaranteed to heat the building in which it is installed to 70° when outside temperature is 20° below zero.

In case it does not we will remove the oil burner, return the boiler to the same condition as before and refund the purchase price of the burner to the buyer.

Wouldn't you like to know more about it?

HARDINGE

FUEL OIL HEAT - FUEL OIL HEAT - FUEL OIL HEAT

A Sales Plan that rings the bell

Electrol's 1928 dealer program is made-to-order for successful selling

Outstanding in 1927

Last year, Electrol made an outstanding record of success. In 1927, Electrol:

Gained—
in number of burners sold;

Gained—
in volume of business in dollars;

Gained—
in number of new dealers;

Gained—
in sales by individual dealers.

Not content with the success of 1927, Electrol plans for a bigger and better year in 1928. Will you share in this success?

Provided with the best oil burner money can build, Electrol dealers have always enjoyed the benefits of a liberal sales policy and aggressive factory sales help.

This year, Electrol's program of sales development for dealers is more attractive than ever. Local newspaper advertising that establishes the dealer's salesroom as oil heating headquarters... Dealer-to-consumer advertising that gets prospects and closes sales . . . A sales plan that rings the bell. And all backed by dominant national advertising.

May we tell you about these plans in detail? And about the liberal, money-making Electrol franchise? Write today for full details.

ELECTROL INC. *of* MISSOURI
177 DORCAS ST. . . . ST. LOUIS, U. S. A.

Electrol is the All-Electric and Entirely-Automatic Oil Burner. It employs the proved principles of Mechanical Fuel Atomization and positive Automatic Electric Ignition.

—And watching over every operation of the Burner, The Master Control stands guard, like a living hand always at the furnace door.

ELECTROL

The OIL BURNER with *The Master Control*

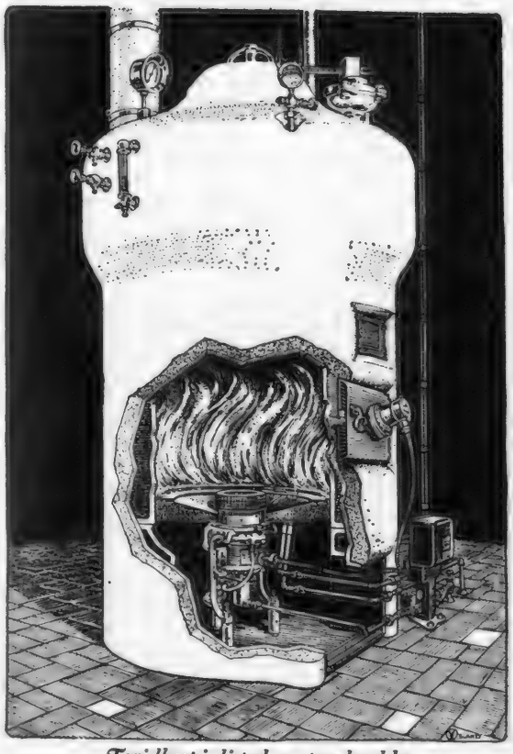
Listed as Standard by the Underwriters' Laboratories, and bears their label. Approved by the New York City Board of Standards and Appeals—and by the Commonwealth of Massachusetts Department of Public Safety

ENJOYABLE
as your radio

NOISELESS
as a cat's tread

Meets Deserved Response

BUT a few months have passed since first we released Toridheet to the national market. In this time thirty-eight well-rated, established distributors within a radius of four hundred and fifty miles from Cleveland have taken on this splendid burner. This means that over two hundred progressive dealers are now established in permanent, profitable businesses. Toridheet is a money-maker for the dealer because it encounters minimum sales resistance by reason of low price. Selling is easy on demonstration and Toridheet stays sold. There are no excessive service calls to eat up profit.



Toridheet is listed as standard by the Underwriters' Laboratories

Study the points of Toridheet superiority

Then write to us for full details of our proposition and complete facts about this successful burner.

TORIDHEET IS

Noiseless, economical, super-safe, fully automatic, low in price. Easy to install. Free from excessive service calls. Listed as standard by the Underwriters' Laboratories. Sells for $385.00 with operating and safety controls. Installation costs vary with tankage capacity desired.

$385.00
With operating and safety controls

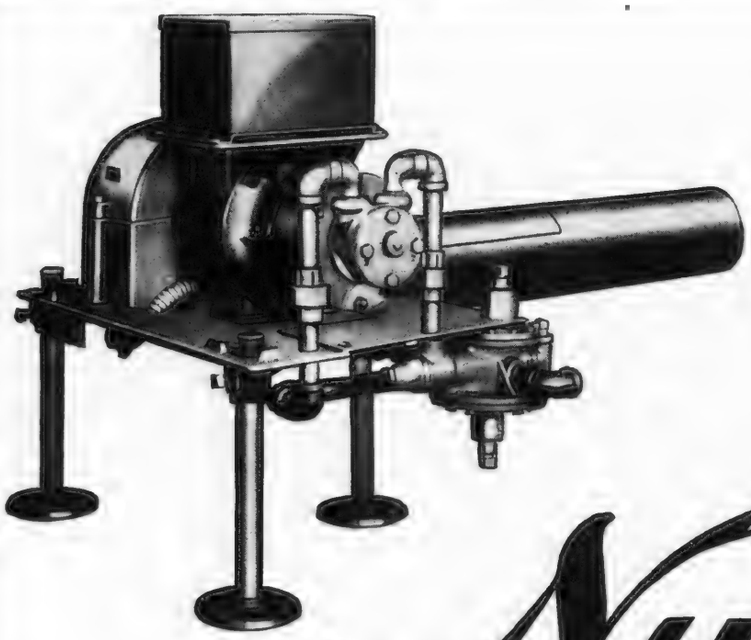
TORIDHEET
OIL BURNER
FOR BETTER HOME HEATING

$385.00
Installation costs vary with tankage capacity desired

Write to

CLEVELAND STEEL PRODUCTS CORPORATION

Madison at West 74th Street — *Cleveland, Ohio*



1928 Models of

AUTOMATIC OIL BURNER

Nu-way

FOR HOME HEATING

Automatic Oil Burners

Now Ready for the Trade

6 IMPORTANT REFINEMENTS

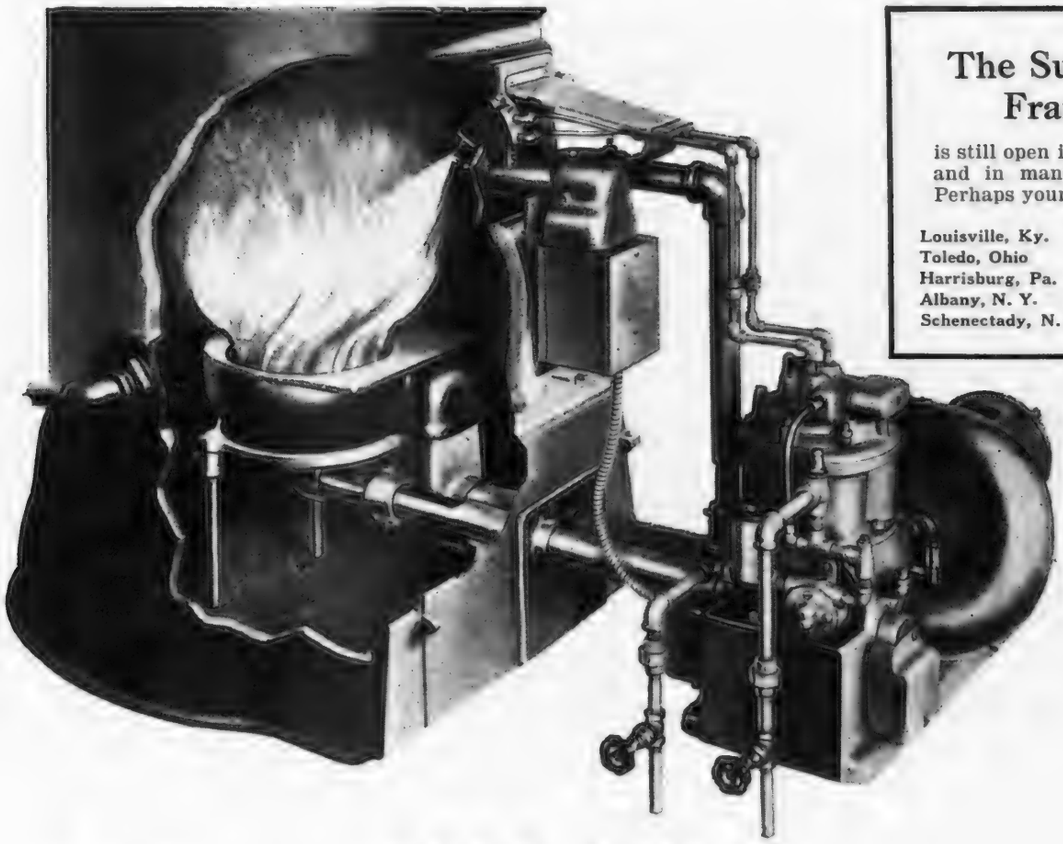
1. *Quieter.* A quiet fire has been developed that eliminates all flame roar.
2. *No extra pump.* Supply pump is now part of burner equipment. Cost and installation of extra pump eliminated.
3. *Built in one unit instead of three.* Controls and pump no longer extra units.
4. *Size of fire constant.* Not affected by change in fuel. Flame can be adjusted to suit shape of fire pot.
5. *Burns less oil.* Improved combustion makes hotter fire and heats more quickly.
6. *Control of atomizer* pressure greatly simplified.

1928 models made in 3 sizes with a heating capacity of from 500 to 8000 feet of steam radiation. Standard Nu-Way line in 6 sizes.

See them at the Chicago convention April 3, 4 and 5. Booth Nos. 68, 69, 70, or write for further details, prices and terms to

THE NU-WAY CORPORATION

ROCK ISLAND, ILLINOIS



The Sundstrand Franchise

is still open in the cities listed and in many smaller cities. Perhaps your city is available.

Louisville, Ky.	Providence, R. I.
Toledo, Ohio	Denver, Colo.
Harrisburg, Pa.	Springfield, Ill.
Albany, N. Y.	Kansas City, Mo.
Schenectady, N. Y.	Columbus, O.

SELL THE *Sundstrand*

for Trustworthy—Economical—Automatic Warmth

The Oil Burner business is "shaking down" as was predicted it would six years ago. Today wise merchants want a concrete answer to these questions.

Is the manufacturer absolutely reliable? Has the burner *proven* its dependability and will the manufacturer guarantee his product amply? Is the burner Safe, Quiet, Fully Automatic and provided with full automatic *Safety* Control? Has it *constant* ignition and will it burn different grades of oil *economically?*

In addition they rightfully ask "Have you a *practical* merchandising and Financing Plan that *Nets* a good profit?"

The Sundstrand is Everything an oil burner should be. We say that without reservations. Our merchandising Plan and Financing Plan has been proven practical. Write or wire for *complete* proof!

Write or Wire for a selling plan so complete and workable that Dealers everywhere are building a permanent, profitable business.

Sundstrand Engineering Co., *Dept. H-4,* **Rockford, Illinois, U. S. A.**

Manufacturers of Precision Machinery Since 1905

More than a Product

... a Service!

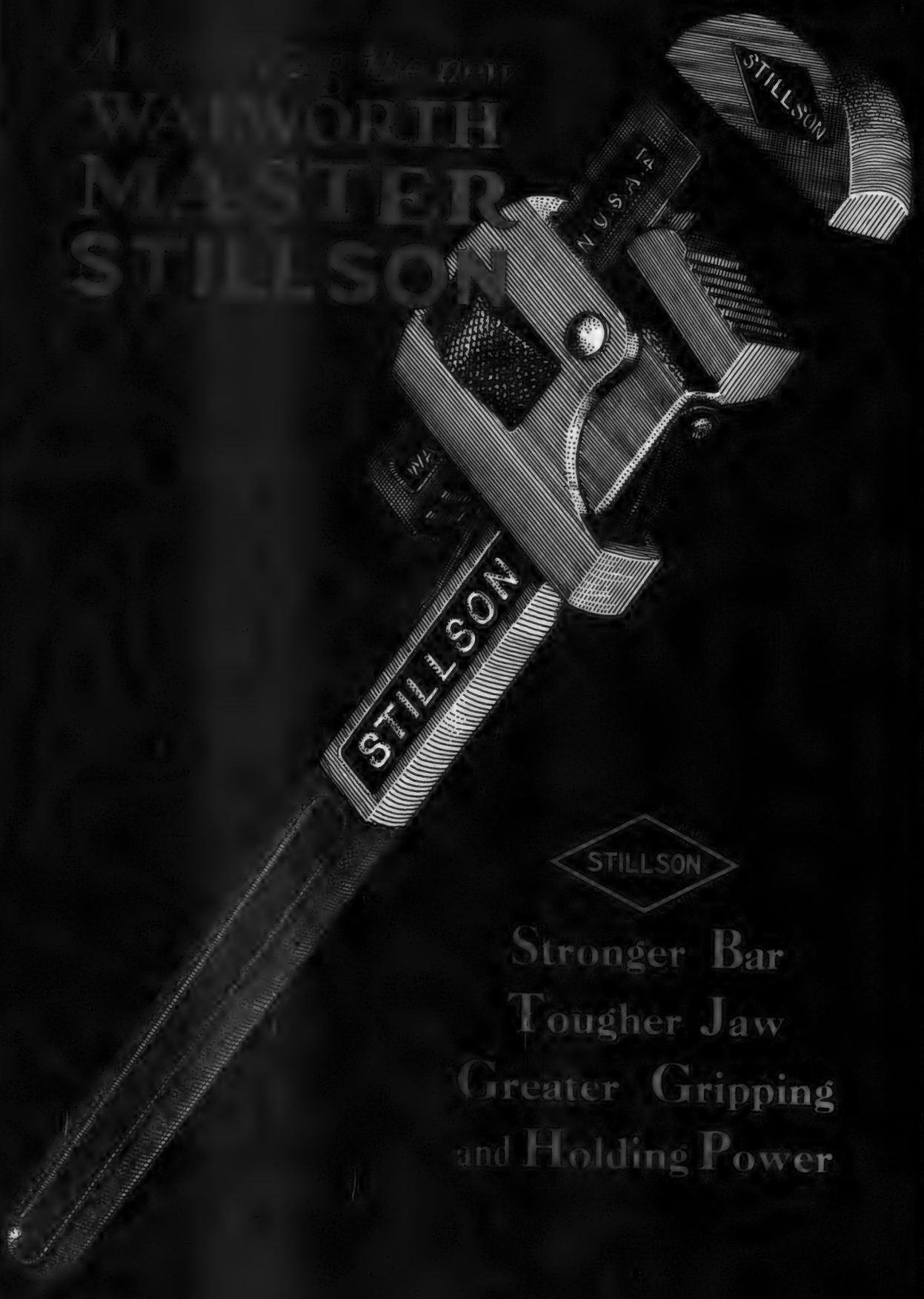
The name, Webster, is more than the name of a product. . . . It is the name of a service which has been developed to a high degree. . . . A service which has brought to oil burner manufacturers a standard of ignition performance which is without a peer in the industry today. . . . This service is the result of the close coordination between development, design and unified control in the Webster plant. . . . Webster Transformers are not only uniformly dependable, but can be supplied to meet the great variation in voltage and frequency which exists in different communities. Consult the Webster sales and engineering departments regarding your problem in booth 97 Stevens Hotel, Chicago, during the convention of the American Oil Burner Association.

WEBSTER ELECTRIC COMPANY, *Racine, Wisconsin*
"Oil Burner Ignition Specialists"

The Webster Ignition Transformer can be furnished with either single or double high tension terminals, 110 or 220 volts, 60 cycle, and 110 or 220 volts, 25 cycle.

Webster Ignition Transformer

The New
WALWORTH
MASTER
STILLSON



STILLSON

Stronger Bar
Tougher Jaw
Greater Gripping
and Holding Power

The

EVERY WORKING PART of the *new* Walwort
Master Stillson has been improved, giving this superb too
tremendously increased strength, toughness, and durabilit
The basic design, originated by Dan Stillson in Walwort

THE JAW

By the most modern scientific heat treatment the strength of th
jaw has been greatly increased. New production methods insu
a uniformity in the quality of this forged steel jaw which insur
that every Master Stillson is identical.

THE BAR

Tests which wrecked all other types of wrenches which we coul
find on the market left the bar of the Master Stillson unharme
The toughness and strength built into the steel are such as to resi
overloads which bent or broke the best handles we were able t
produce under our former manufacturing practices.

THE TEETH

New hardening processes, scientifically developed and aut
matically controlled, give to the teeth of the Master Stillso

MASTER

shops in 1869, is unchanged. The Master Stillson is no heavier; it retains the fine balance and working ease characteristic of the Genuine Walworth Stillson. Yet, the Master Stillson is upwards of 50 per cent stronger.

a gripping and holding power far superior to even the old Walworth Stillson. Moreover, a slight change in the design of the teeth adds to their strength, so that the Master Stillson survives shocks and excess loads which shear off or break the teeth of imitation Stillsons.

THE NUT

Improvements in the Master Stillson enable it to withstand tests of far greater severity than ever before were attempted. We had to improve the quality of the nut to bring it up to the standard of the other parts.

NEW DRESS

To make the Master Stillson easily recognized, we have adopted a red lacquered dress for both steel and wood handles. Our trade mark — the word Stillson in a diamond — identifies as genuine the red handled Walworth Master Stillson.

MASTER CRAFTSMEN

1800 LBS. LOAD ON THE HANDLE

FOR WEEKS, in public exhibitions, the superiority of the new Walworth Master Stillson has been demonstrated in this test. A 14-inch Master Stillson grips a solid steel rounded bar. A knife-edge contact brings to bear upon the handle of the Stillson, one-half inch from the end, a load approximately 7½ times the weight of the man suspended on the end of a 72-inch length of pipe. In this case the load is approximately 1800 pounds.

No other wrench of the Stillson type has been able to survive an identical test.

WALWORTH

Distributors in Principal Cities of the World

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WALWORTH INTERNATIONAL CO.,
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WALWORTH CO., LIMITED,
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TRADE MARK STILLSON REGISTERED U.S. PATENT OFFICE

How Long Will the Insulation Last?

A MIGHTY important question, especially when you are considering insulation for underground steam lines.

The efficiency of the underground steam line depends upon the efficiency of the insulation that is used to keep the heat in the pipe and deliver it at the other end.

But it is equally important that you know how long that insulation will retain its efficiency — how long it will last.

BANROC Insulation meets that problem to perfection. Not only does it lead the efficiency list as the U. S. Bureau of Standards, — *it is permanent!* Water will not harm it — it will not decay or disintegrate. Some of the first ever made, over thirty years ago, is still in perfect condition, giving perfect satisfaction.

There are many more features about BANROC Insulation that are equally important, — you should know about them. A BANROC representative near you is anxious to tell you about them. Your inquiry incurs no obligation. Write today!

BANROC No. 45 Pipe Insulation, developed especially for use on underground steam lines, is easily applied by simply slipping around the pipe and wiring on. In case of repair to the line, it can be removed and replaced without loss.

"BANROC INSULATION Provides Permanent Protection Against Loss of Heat"

Says Mr. B.T.U.

GRAND RULER OF THE REALM OF HEAT

BANNER ROCK PRODUCTS

ORIGINATORS of ROCK WOOL PRODUCTS

Mail this Coupon to-day

BANNER ROCK PRODUCTS CO.
Alexandria, Indiana
Gentlemen — Kindly send us your "*Better Investment*" Booklet which describes briefly all BANROC Products.

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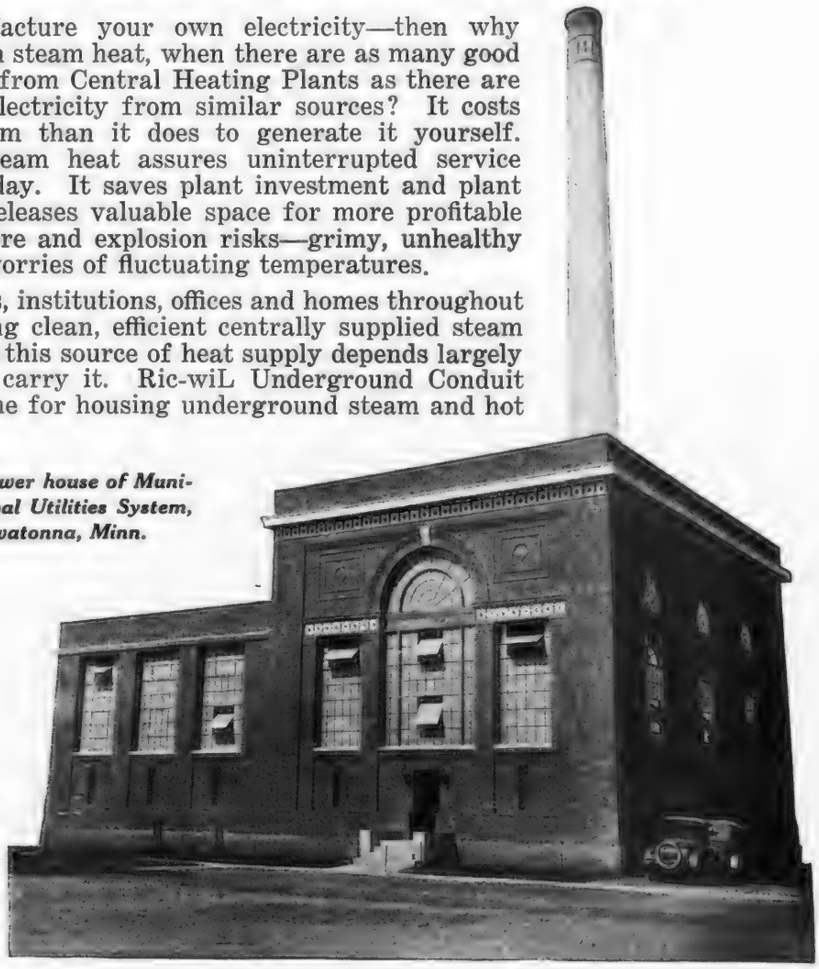
Why Have Your Own Heating Plant?

You wouldn't manufacture your own electricity—then why manufacture your own steam heat, when there are as many good reasons for buying it from Central Heating Plants as there are for buying gas and electricity from similar sources? It costs no more to buy steam than it does to generate it yourself. Centrally supplied steam heat assures uninterrupted service every minute of the day. It saves plant investment and plant maintenance cost. Releases valuable space for more profitable use. You eliminate fire and explosion risks—grimy, unhealthy dirt, the bother and worries of fluctuating temperatures.

Thousands of plants, institutions, offices and homes throughout the world are enjoying clean, efficient centrally supplied steam heat. Efficiency from this source of heat supply depends largely upon pipe lines that carry it. Ric-wiL Underground Conduit Systems stand supreme for housing underground steam and hot water lines.



Power house of Municipal Utilities System, Owatonna, Minn.

The Ric-wiL Company, 1567 Union Trust Bldg., Cleveland, O.

This Folder ✓ ✓ *In Your* Files

is something for which you will have frequent use. It is a General Insulation Folder — contains a fund of helpful material compiled and prepared by insulation engineers— and will be of great service in figuring fuel savings and other problems relating to scientific insulation. Convenient in size and arrangement— easily accessible when filed.

INSULITE
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THE INSULITE COMPANY
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Fill out the coupon or write us a letter or card and a copy of the folder will be sent immediately — without charge.

Please send a copy of your General Insulation Folder.

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City..... State.....

Zero outside, 70 degrees inside, without forcing the heating plant. This you accomplish with ½-inch insulation in side walls and 1-inch in your roof—

If

The ½-inch thermal insulation is installed to create two air spaces in your walls. Such construction is scientific—encourages good health—prevents insidious floor draughts—and reduces your fuel bill one-third.

2 air spaces

and the *Economical* thickness brought Insulation up-to-date .....

PRIMITIVE insulating methods are now brought up-to-date by a scientific *material* and a scientific *method of application.*

Modern science says: Install ½-inch insulation to form *two* air spaces in your wall. *Without the two air spaces you must use ¾-inch material. Correct utilization of the extra air space proves* FLAX-LI-NUM *to be the economical insulation.*

Flanged FLAX-LI-NUM was created to fit this scientific method. The ½-inch sheets for your walls come ready to install *between the studs.* Two air spaces are formed. The sheets go in easily, quickly, correctly and without waste.

For your roof, where 62% of the heat losses occur, FLAX-LI-NUM supplies the correct 1-inch thickness *in one piece.* Again handling costs are reduced and installation simplified.

To those tempted by insulations which take the place of building materials, *without forming two air spaces in the wall,* these facts are vital.

Know what you buy — *know* how the economical thickness should be installed to get the most for your money. Gladly will we send you results of tests of the two air space method by the U. S. Bureau of Standards — also complete details of how FLAX-LI-NUM fits this method most economically. Mail the coupon now.

FLAX-LI-NUM INSULATING CO., ST. PAUL, MINN.

Flax-li-num

THE CORRECT BUILDING INSULATION AND SOUND CONTROL MATERIAL

The Modern Scientific Insulation

Flax, containing billions of tiny dead air cells, is an ideal material for thermal insulation. FLAX-LI-NUM is made from this tough fibrous material, used in the making of linen. The flax is purified, made vermin-proof and compressed into semi-rigid sheets. FLAX-LI-NUM is just as thick in the finished wall as when it left the factory. It does not puncture, crack nor tear when handled on the job.

H. v.-2

FLAX-LI-NUM INSULATING CO.
St. Paul, Minnesota

Send me results of U. S. Bureau of Standards tests of the two air space method of insulation. Also send complete information about Flax-li-num.

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This huge plant is squarely and securely behind Newport Boilers

backed by these facilities

The Newport business is growing—production is increasing to meet the public demand—and the Newport Sales Drive means greater sales for you this year.

Now in our 15th year of successful boiler manufacturing experience, we wish to call the trade's attention to the unlimited manufacturing and distributing facilities and the strong financial stability behind the Newport Boiler.

More and Better Heating Contracts for you

Tie up with our Sales Drive and Newport's exclusive features. Let us help you get more and better heating contracts. A request brings complete information—no obligation—also valuable *Free* booklet, "The Practice of Scientific Heating."

NEWPORT BOILER CO.

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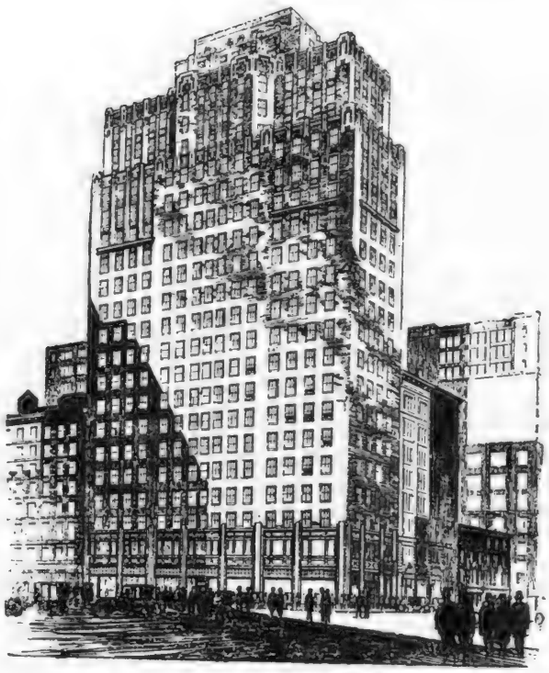

OFFICE BUILDING
386 Fourth Avenue, New York City

The New Home of
The Heating and Ventilating
Magazine

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Heating Contractors

MARSH
Cone Disc Modulated Valves

Used throughout on this Job

Marsh Cone Disc Mod., Fig. 148

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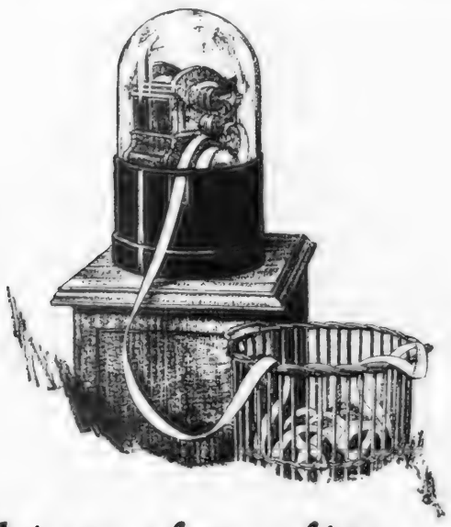


Speaking of profits . . . . here is a dollar that is earning a dollar and forty-five cents a year

WHEN it is all said and done, what we throw into furnaces is not just coal —*it's money!* . . . WITNESS: A leading textile manufacturer* of northern New York was burning up $270.00 per day for heat, power and process steam. At the suggestion of their consulting engineer, they converted their antiquated high pressure heating system to a modern Webster Vacuum System which cut their fuel cost down to $196.00 per day and their yearly repair bill by $500.00. A net saving of $17,300.00 per year from an investment of $12,000.00 for modernization . . . 145 per cent.

name on request

- since 1888

Webster Systems of Steam Heating

Warren Webster & Company, Camden, New Jersey
Pioneers of the Vacuum System of Steam Heating
52 U. S. Branch Offices—*In Canada, Darling Bros., Ltd., Montreal*

Another Example!

The failure of its heating system to maintain all rooms at a comfortable temperature was a serious handicap to the management of the Hotel Endicott in New York City. So in 1923 the chief engineer made an investigation to determine what changes would be necessary to convert their obsolete two-pipe gravity system to a modern Webster Vacuum System of Steam Heating.

The piping was revised where necessary. Webster Sylphon Traps were installed on some radiators, while on others, Webster Sylphon Attachments were installed in the old valve bodies. Two motor-driven vacuum pumps, one a spare, which maintain a vacuum of from 4 to 5 ins. on the return line, completed the installation.

With the Webster System conditions have improved, surprisingly. Instead of using three boilers, the cold weather load is easily carried with the one large boiler, and the farthest rooms in this difficult-to-heat building are as comfortable as those in the central portion. Regulation of heat is much more effective, pounding in the radiators has stopped, and ruinous leaks have ceased to exist.

The savings in fuel, while amounting to $432.00 annually, is of relatively small importance when compared to the increase in heating efficiency and comfort of guests. The good will of its patrons is one of a hotel's greatest assets, and it should never be jeopardized by a heating system which cannot maintain a comfortable temperature in every room—at all times.

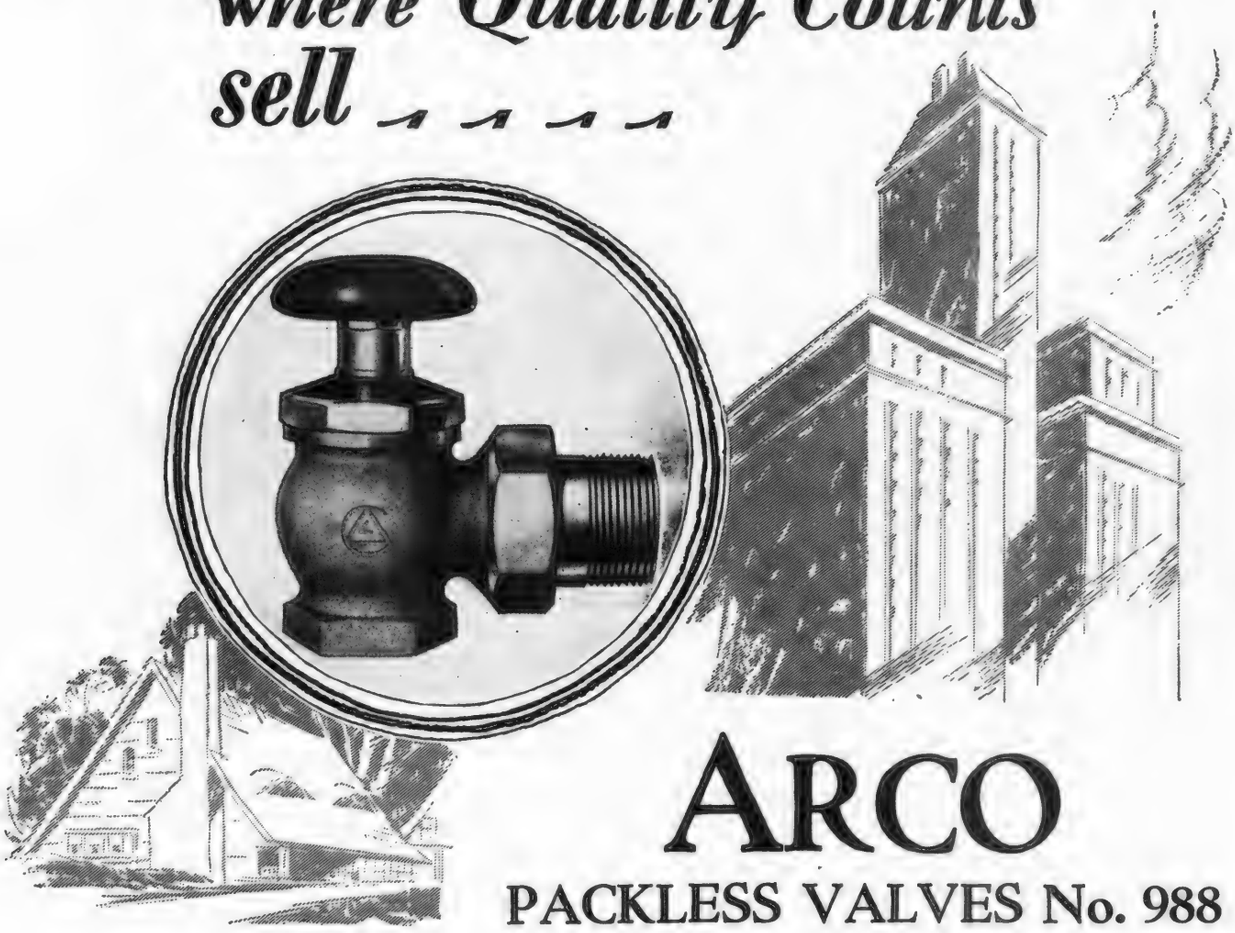
Can we apply Webster Service to increase the income from your Building?

Write for data.

More than 46,000 installations in America's finer buildings

For SPRING BUILDING

where Quality Counts sell



ARCO

PACKLESS VALVES No. 988

The spring is always a season of proud building. Long dreamed of, carefully planned houses take shape. Houses that husbands and wives will soon be pointing to with pride — houses that are to be homes.

Here is a great market for ARCO Packless Valves. Tell these careful builders about ARCO superiority. Do not talk price. Talk ARCO Packless. The first cost is the only cost — no repacking — absolute protection against leaks — smart appearance — open and close with one smooth turn.

ARCO Packless is the right valve for radiator surroundings—small residence or skyscraper—steam, water or vapor. For new work or the modernization of old jobs. You are favoring your customers when you sell them ARCO Packless Valves. And at the same time you link your name with lasting satisfaction and qualify yourself as a heating specialist.

Identify your work with the satisfaction your customers will experience from an ARCO Packless Valve installation, by having your name etched in nickel on the black dial.

AMERICAN RADIATOR COMPANY

816-20 So. Michigan Ave. ACCESSORIES DIVISION Chicago, Illinois

Makers of IDEAL Boilers, AMERICAN Radiators, ARCO Tank Heaters, VENTO Ventilating Heaters, AIRID Air Valves, MERCOID Controls and devices for drying, humidifying, cooling and refrigeration.

Leader KOOLSTACK BOILERS

A Steel Boiler *for* Oil Burning *—also for Coke and Anthracite Coal*

Why Burn 35% to 50% More Fuel?

A HOT CHIMNEY MEANS WASTE. There is nothing mysterious about the economy of the LEADER KOOLSTACK BOILER. It's simply a matter of having more heating surface and causing the products of combustion to remain in the boiler until *all* of the effective heat has been absorbed.

LOW STACK TEMPERATURE is the outstanding characteristic of the LEADER KOOLSTACK BOILER. With a stack temperature of less than 300° fuel economy is inevitable.

QUICK HEAT. Koolstack Boilers are ideally adapted to intermittent firing. They heat quickly because it is not necessary to heat the entire water content. The principle of counter-flow brings the hottest gases in contact with the hottest water.

ADAPTABILITY. Though designed for Oil Burning, KOOLSTACK BOILERS show remarkable performance records with Coke and Anthracite Coal. They are not recommended or intended for use with soft coal.

HEATING CONTRACTORS have in the KOOLSTACK BOILER an opportunity for greater profits—and a guarantee of more economical heating for their customers. Write for Bulletin No. 563 and complete information.

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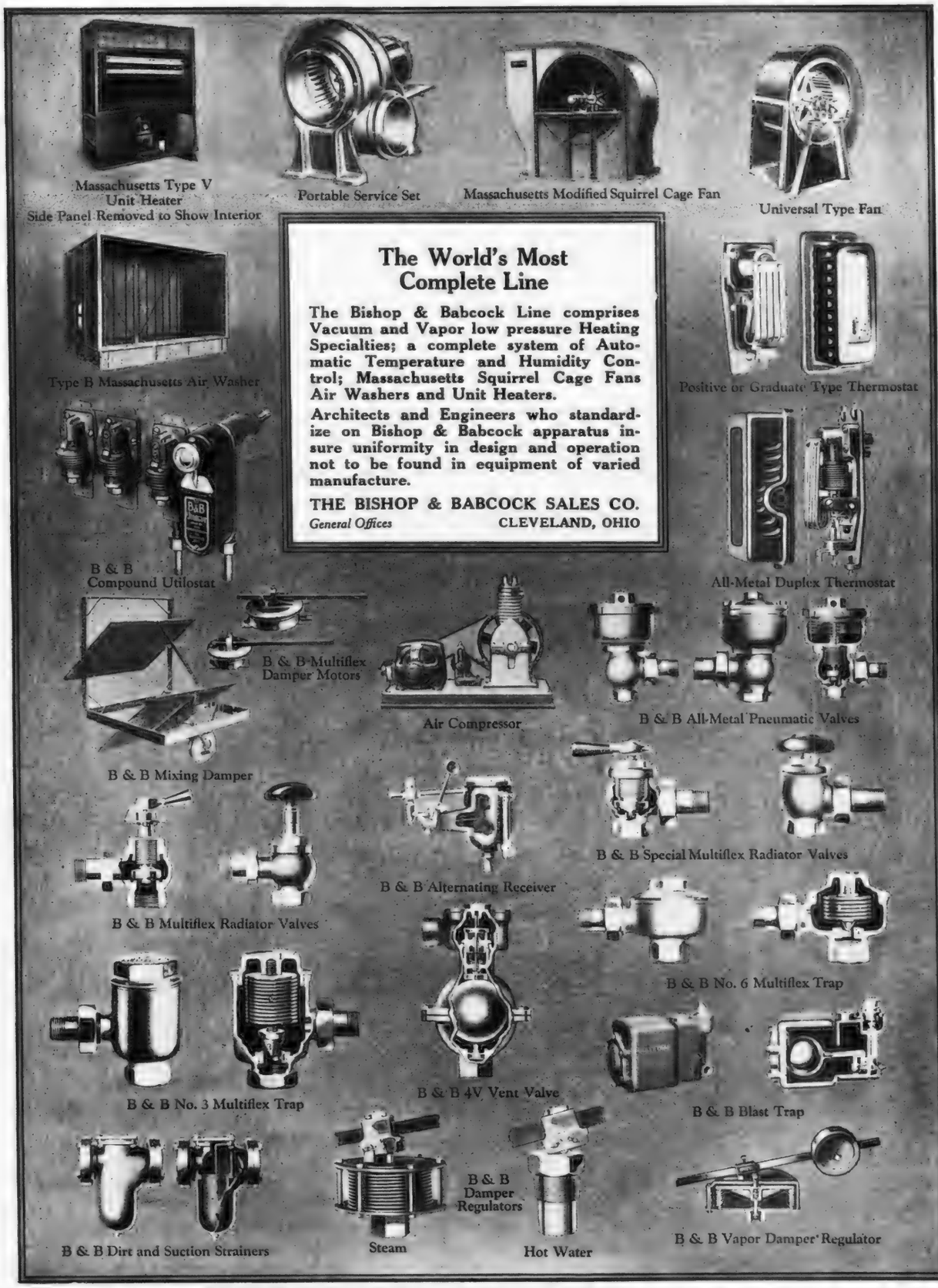
Massachusetts Type V Unit Heater
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The Bishop & Babcock Line comprises Vacuum and Vapor low pressure Heating Specialties; a complete system of Automatic Temperature and Humidity Control; Massachusetts Squirrel Cage Fans Air Washers and Unit Heaters.

Architects and Engineers who standardize on Bishop & Babcock apparatus insure uniformity in design and operation not to be found in equipment of varied manufacture.

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BISHOP & BABCOCK

TEMPERATURE REGULATION
HEATING SPECIALTIES VENTILATING EQUIPMENT

Heat that Circulates at OUNCES instead of POUNDS Pressure at the Boiler!

Folks complain about the weather mostly because their sluggish heating systems in home or office won't keep up with the weather's temperamental changes. Frosty nights followed by warm days in Fall and Spring, cold snaps hard on the heels of mild spells in Mid-Winter, keep rooms alternately overheated and underheated and the occupants irritable, and peevish over fuel bills. However, where B. & J. Vapor Equipment has been installed, folks forget about the weather, be it cold or mild.

B. & J. Vapor Valves—FLEXIBLE and ECONOMICAL Heat

Flexible, because one radiator valve in each room controls the room's heat to a degree—as much or as little heat as comfort dictates without waiting. *Economical*, because Vapor circulates freely at *ounces* rather than at *pounds* of steam.

B. & J. Valves are in the Park Square Building, Boston, and such fine homes as the residence of Vincent Astor, because they are better built—literally "Made Like an Instrument," for permanent precision in operation. Before specifying, compare them point by point with any other valves made.

Barnes & Jones

Better Built Vapor Valves

128 Brookside Ave.
Jamaica Plain, Boston

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WARMTH WITHOUT WASTE

ENGINEERS have pronounced the invention and successful application of the Dunham Differential Vacuum Heating System utilizing Sub-Atmospheric Steam as the outstanding heating achievement of the decade.

It has long been a matter of common knowledge among Engineers that the amount of radiation estimated for the coldest weather of a heating season was excessive for the requirements of the mild temperatures which prevail through 95% of the usual heating season.

Sub-Atmospheric Steam Overcomes These Conditions

It prevents costly overheating with excessive window opening. It provides healthier indoor temperature of buildings.

With the widespread installation of the Dunham Differential System has come a new appreciation of the comforting agent we know heat to be. And also a new understanding of heating economy. For with the removal of overheating the Dunham System cuts fuel costs at least 25%.

A fundamental point about this new system of heating is the degree of heat given off by the radiators. It permits circulation of steam in the radiators on as low as 133 degrees (for mild weather) with increasing temperatures (in extreme weather) to correspond to heat lost from the building.

These are facts that should challenge the attention and closest investigation of Engineers, Architects and Heating Contractors.

Over seventy branch and local sales offices in the United States, Canada and the United Kingdom bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will counsel with you on any project.

Look for the Name
DUNHAM
This nameplate identifies a genuine DUNHAM Radiator Trap

The DUNHAM
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A FIXED DIFFERENTIAL IN PRESSURE — Heating System — A VARIABLE DEGREE OF VACUUM

U. S. Patent No. 1644114. Additional patents in the United States, Canada and Foreign Countries now pending.

C. A. DUNHAM CO.

DUNHAM BUILDING
450 East Ohio Street, Chicago

SUB-ATMOSPHERIC STEAM

Where is there another dealer deal like this?

HART OIL HEAT

Dealer friendship—building and selling from the dealer's side of the desk, is the foundation of this successful business.

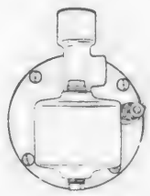
President MacInnis knows that the factory success can be measured by the number of money making dealers. One of the country's most brilliantly successful oil burner dealers, before coming to this factory from Seattle. He brings the dealer angle to the president's chair.

Vice President Bohn knows how to protect dealers against losses from forced over-buying and costly service expense, learned through his many years' oil burner experience as president of the East's largest distributors.

Vice President Merrell knows the wisdom of making the dealer a partner in the business because he is the Central West's most successful dealer at St. Louis.

These men, with their associates, have developed the fairest selling agreement ever written for the retail burner business — a dealer deal of favorable discounts without commitments, exclusive territory and practical sales plans from men who have won national leadership as dealers.

1



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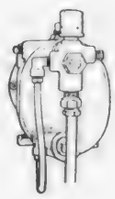
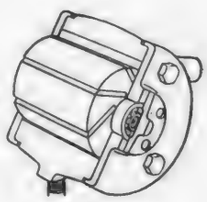


and where is there another burner line with so many *exclusive mechanical superiorities?*

3



1 When burner stops all unburned fuel oil, in the feed line, flows back to this drain-back trap. Eliminates ignition puff; insures smooth start.

2 Vacuum chamber makes it impossible for oil to flow from the bulk supply outdoors to the unit itself. Fuel always under vacuum control. No danger of flooding the basement with oil.

3 Hart pump makes a quick-igniting, misty fog out of air and oil. Also creates the vacuum that operates and controls the exclusive Preferred-Hart vacuum oil feed.

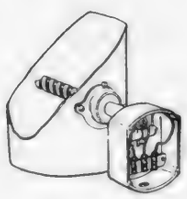
4 Patented Preferred-Hart flue thermostat guards the proper starting and running of the unit.

5 Special locking switch eliminates waste of electricity and gas. Operates only 40 seconds—the length of time required for perfect combustion.

6 Exclusive Preferred-Hart re-cycling switch automatically and instantly stops the motor in case any device falters in service. Rarely, if ever, is called into service.

7 Movable electrodes prevent carbon fouling the spark. Timed to synchronize with the 40 second Preferred-Hart timing switch.

4



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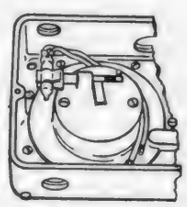

Our dealers tell us, these exclusive Preferred-Hart features, with scores of others, make Preferred-Harts sell easy and stay sold

New small burner for small jobs

Economical in price and operation. Adaptable to warm air heating plants without removing grates or relining fire box. Quickly installed through fire door. Completely equipped with all the special devices that eliminate service on larger Preferred-Harts. Burns low gravity fuel oil. Write for details.

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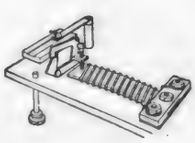
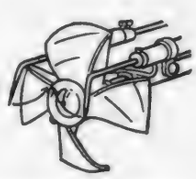


Write for prices and discounts

Distributorships available for territories up to entire states. Our larger dealers need wholesale men to contact their sub-dealers. And there are scores of openings for real retail salesmen. A valuable franchise, or excellent sales opportunity, may be open in your territory. Write

7



Preferred Oil Burners, Inc., Peoria, Ill.

Unit heaters in plant of the Northwest Engineering Company at Green Bay, Wisconsin. Each one of the heaters is equipped with a No. 30 Armstrong Trap. The No. 2 Trap is used on the main headers. The No. 30 trap is shown in detail above—the No. 2 trap below.

Are your customers' heating costs as low as they should be?

ONE way to find out is to determine how much steam he is using in his heaters and how much of it is being wasted. Unless heaters are kept properly drained of all condensate their capacity and efficiency are reduced. Not only unsatisfactory heating is obtained but more steam is needed for a corresponding heating effect. In other words, it is costing your customer more for his heating than it should.

A good steam trap will drain the condensate without the loss of live steam and will not become air-bound or clogged. Armstrong Steam Traps are water sealed against the leakage of live steam, they discharge all air, oil and dirt with the condensate, and operate independently of temperatures and pressures. They require no adjustments and because of the heat treated chrome steel valves and other carefully constructed parts very little wear occurs and maintenance is reduced to practically nothing. There are many Armstrong Traps giving efficient service which have not been off the line for three years and more.

Considerable savings have often been effected with Armstrong Traps. In one instance where steam is bought on a metered basis, the monthly bill was reduced from $76 to $27 by replacing the traps in use with Armstrongs. Many heating engineers do not consider a heater installation complete without Armstrong Traps.

ARMSTRONG · INVERTED BUCKET · STEAM TRAP

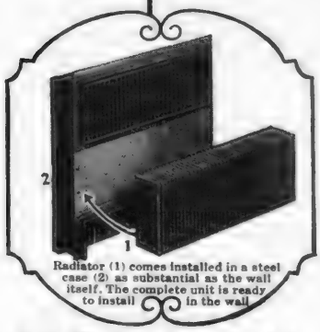
ARMSTRONG MACHINE WORKS

346 Maple Street, Three Rivers, Michigan

DISTRICT REPRESENTATIVES IN 36 CITIES

H V 4-Gray

Radiators...yes...*but out of sight ...out of the way*



Radiator (1) comes installed in a steel case (2) as substantial as the wall itself. The complete unit is ready to install in the wall

HERMAN NELSON
Invisible
RADIATOR

For Steam, Hot Water, Vapor or Vacuum Heating

With

The Unit Core
RADIATOR

All the facts about the HermanNelsonInvisible Radiator are contained in this interesting book.

In the better homes, offices and banks—in fine buildings everywhere—an entirely new standard of comfort and beauty has been created by a radiator that fits *in any standard wall or partition* —the Herman Nelson Invisible Radiator.

Out of sight and occupying not even a square inch of floor space, this modern heating unit permits of unlimited scope in the arrangement of furniture. Yet it offers every advantage of the finest radiator heat.

The Herman Nelson Invisible Radiator, moreover, is leak-proof, rust-proof, silent, indestructible; even freezing will not harm it. Once installed, it never again demands attention.

Learn how the Herman Nelson Invisible Radiator will add to your prestige and profit. Full information comes in Book 33. Send coupon for your copy.

THE HERMAN NELSON CORPORATION, MOLINE, ILLINOIS

Builders of Successful Heating and Ventilating Equipment for Over 20 Years

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PHILADELPHIA			MINNEAPOLIS			WINNIPEG, MAN.

THE HERMAN NELSON CORPORATION, *Moline, Illinois*

Please send me the illustrated book Number 33, and price list on Herman Nelson Invisible Radiators.

Name.....*Address*.....

The beauty of the finest Cabinets—*plus*
a more efficient heating unit—that's

McQuay Cabinet Radiator

THE CABINET: of heavy furniture steel can be painted or enamelled any color or shade according to individual tastes. Made in most every size and dimension to fit any desired space.

At Last—a radiator that is not only beautiful in appearance, and in harmony with the decorative treatment of rooms, but also a *heating unit of exceptional efficiency*—the McQuay Cabinet Radiator.

Cold air from the floor enters the cabinet at the bottom—passes thru the heating element at the bottom of the cabinet and is impelled by "convection" thru the grille, into the room—a *positive circulation of warmed air,* resulting in far quicker heating. A water cabinet above the heating element humidifies the air, before it passes into the room.

Actual tests prove that McQuay Cabinet Radiators *heat a room quicker, and at less cost,* as well as eliminating the necessity for bulky, unsightly, old-time radiators.

McQuay Unit Heater

The Patented "Lock Seam" Tubing —*a distinctive McQuay development* —ends the leakage hazard. Seam separations or blowouts are unknown. Tubes are heavy brass, tinned inside, resisting rust and corrosion under all circumstances.

THE HEATING ELEMENT: consists of a series of flat horizontal tubes, coated with tin inside, securely held in place by copper fins, and firmly nested in bronze metal headers. It is immune from rust or corrosion, *will not "clog"* and is practically indestructible.

The complete McQuay Line consists of Unit Heaters; Cabinet Radiators, of practically every capacity and dimension to fit any desired space; Cabinet Radiators for bathrooms, designed to be placed back of lavatories or in other "out-of-the-way" places: Also Concealed Radiators for use in walls, under windows, etc. The same tried and proven McQuay principles are embodied in all of them.

Ask for literature describing the complete line.

McQUAY RADIATOR CORPORATION

Factory at Minneapolis, Minn.
General Sales Office: Pure Oil Building, CHICAGO
Eastern Branch Office: 2148 Graybar Bldg., New York City
Branches in all principal cities.

MERCOID

COMBINED PRESSURE AND LOW WATER CONTROL

U. S. A. PAT. NOS.
1,473,120
1,598,874
1,640,869
1,644,935
1,658,013
1,521,638
OTHERS PENDING

Insures

POSITIVE PROTECTION *for*

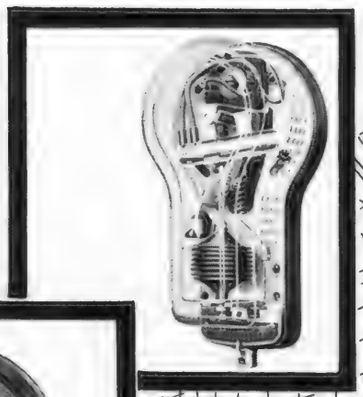
YOUR BOILER

WRITE FOR FIGURE 70 BULLETIN

THE MERCOID CORPORATION

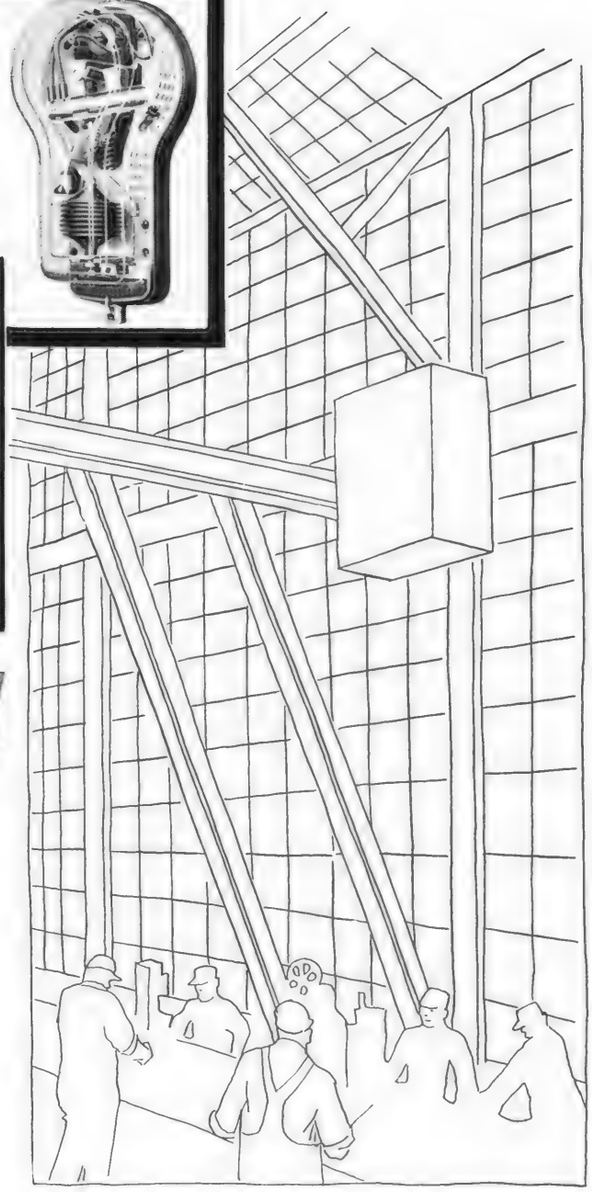
564 W. Adams St.
Chicago

25 Church Street
New York City



Mercoid Thermostat — Figure 21 Standard range 56° to 80° F. Operating Differential of 2°.

Mercoid Pressure Control—Figure 31. For dual Control.



Unit Heater Control

Unit Heaters insure greater comfort, save fuel through the proper concentration and circulation of heat, and are economical in operation.

Controlled by the Mercoid System of Direct Control, they reach their highest efficiency in providing perfect regulation of temperature.

Mercoid Thermostats are furnished with a standard range of 56° to 80° F. and, for lower temperatures, a range of 38° to 60° is available. Ranges for still higher or lower temperatures can be supplied. Thermometers are furnished where specified.

In operation on regular line currents, relays and remote controls are unnecessary. Mercoid Thermostats will automatically control motors of 1 h. p. or less, within guaranteed ratings, for normal working loads of 10 amperes at 110 volts, or 5 amperes at 220 volts, *either A. C. or D. C.*

The Mercoid System of Direct Control may be employed to advantage under practically any operating condition. Mercoids will control the largest motors, where operating as pilot switches.

THE MERCOID CORPORATION

564 W. Adams St.
Chicago

25 Church Street
New York

MERCOID
System of
DIRECT CONTROL

Today

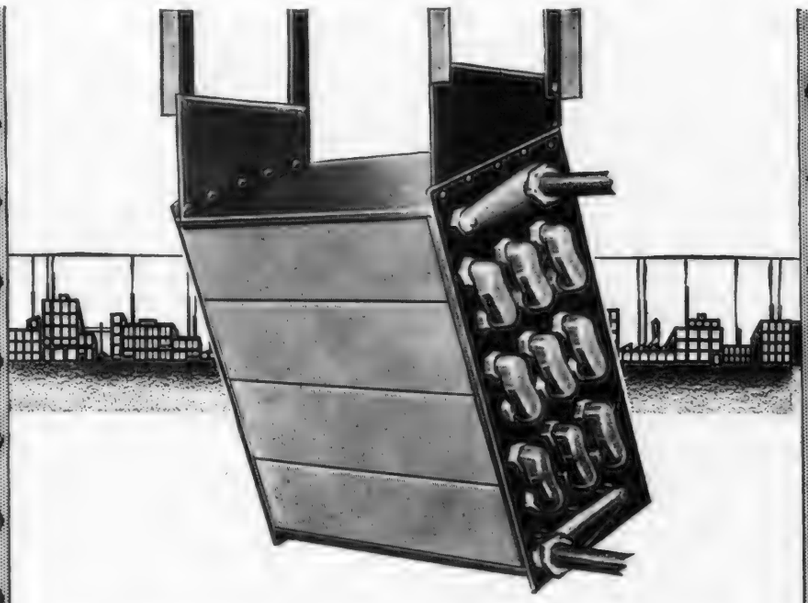
Trane Heat Cabinets

Instead of Radiators in Thousands of Homes

WHY?

1. They satisfy the modern demand for greater beauty in rooms. Finished in any tone or grain, to match furniture and decorations.
2. They provide still greater comfort. Employ an entirely different principle—convection. Copper-fin heating element. Heat instantly controlled by the damper grille.
3. They are easier to install. Total weight 1/5 as much as equivalent cast iron radiation. One man can unload and distribute all units for an 8-room house in two or three hours.
4. Installation costs are lower and the heating contractor gets his money sooner. No temporary radiators necessary — no waiting for other trades to finish.
5. They fit any make of heating system designed for radiators, in *old or new buildings*. Open up a big field in modernizing old homes. No changes in piping necessary.

HEAT CABINETS **TRANE** CONCEALED HEATERS
··· PUMPS AND HEATING SPECIALTIES ···



IN THE FRONT RANK OF UNIT HEATERS

TRANE Unit Heaters have earned an enviable reputation for efficiency in industrial heating.

Their remarkable success has been achieved in the face of intense competition. Now when the universal trend toward unit heating has focused attention on this field and attracted dozens of makers, only an outstanding development can so quickly induce industrial executives to sign on the dotted line.

The reasons for this immediate success — copper heating element for 150-lb. pressures, exceptional fan capacity, and many other important features — are fully explained in Trane Bulletin 23.

Ask us for a copy.

THE TRANE CO. (Est. 1885)
206 Cameron Ave. La Crosse, Wis.

TRANE
UNIT HEATERS

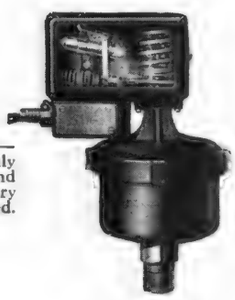
New ARCO Solenoid Valve

The New ARCO Solenoid Valve—for any 110 v. or 220 v. current. Cast brass outlet box integral part of valve body. 3/8" pipe connection. Connecting wires at bottom of instrument.

Center of Extraordinary Interest At Oil Burner Convention

MEMBERS of the Oil Burner Industry displayed very great interest in the New ARCO Solenoid Valve at the recent Chicago Oil Burner Convention.

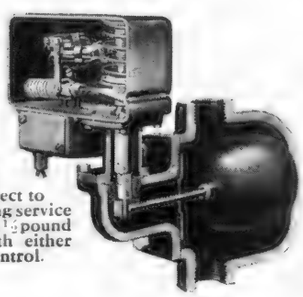
The New No. 682 ARCO Solenoid Valve—for oil, gas or water—is designed for high and low flame adjustments, operating on the metering valve principle with ample power for pressure up to seventy pounds. It provides positive cut-out of oil supply operating simultaneously with the starting and stopping of the motor.



Model C MERCOID—vapor control—especially designed for vapor and low pressure, where very close control is required.

Members of the heating industry all over the country have added to their success by employing MERCOID Controls. Now the New ARCO Solenoid Valve is introduced as another American Radiator Company achievement in the oil burner field and we urge every oil burner man to investigate this new instrument.

The MERCOID No. 612 combination low water cut-out and pressure control for oil burners was also the center of much interest at The "Show". This instrument combines the low water cut-out feature with pressure control—one control performing two jobs. MERCOID No. 612 is a safety control since, with oil fired boilers which require no attention, owners frequently fail to maintain the water line and damage to the boiler results.



The MERCOID No. 612—combination low water cut-out and pressure control for oil burners. This also carries full line current. No transformer or intermediate mechanisms, subject to failing or requiring service—adjustable from ½ pound to 8 pounds with either close or wide control.

The two above mentioned MERCOID products are only part of the entire line of MERCOID Controls made and sold by the American Radiator Company. The complete line also includes the MERCOID Thermostat 845 and 848 types for steam, water and vapor.

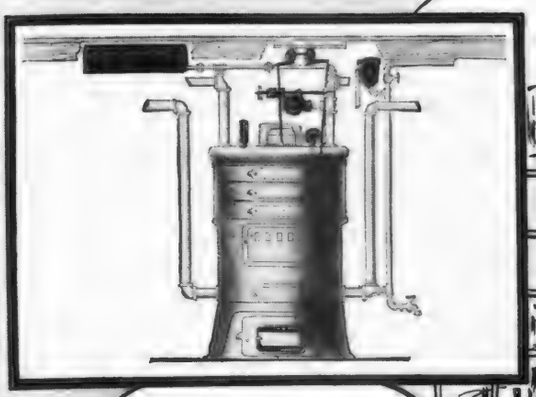
Engineering data sent on request.

AMERICAN RADIATOR COMPANY

ACCESSORIES DIVISION DEPT. H

816-820 So. Michigan Ave. Chicago, Illinois

Makers of IDEAL Boilers, AMERICAN Radiators, ARCO Tank Heaters, VENTO Ventilating Heaters, AIRID Air Valves, MERCOID Controls and devices for drying, humidifying, cooling and refrigeration.



Satisfied! —and they tell others

The best kind of advertising!

ONE of our dealers told us recently, "When I complete a Thrush installation, I know it is going to deliver 100 per cent Heating Efficiency---now---next year ---and many years in the future! It will continue to build good will for me! My customers are always satisfied and that is why I like to sell it."

Of course, there is another reason why dealers like to sell Thrush System and that is *profit*. The margin is generous, the sales plan is very effective, instalation is not expensive and Thrush Equipment gives any dealer the edge on competition.

Often a well planned Thrush job costs less than an ordinary unregulated gravity system. It always makes any hot water heating job work better.

Say goodbye to sluggish heat when you put Thrush System on the job. Thrush changes the job from gravity to a controlled pressure system with automatic damper regulation---that means increased heat transmission, greater fuel efficiency and more home comfort. Your customers will praise it highly and thank you for suggesting it.

One customer pleased means many more prospects. That is why thousands of dealers have found that Thrush System is truly a business builder. Now is the time to go after business. We have a complete series of posters, blotters, folders and dealer ads that will help you.

Coupon!

H. A. THRUSH & CO.
Peru, Ind.

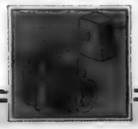
Send me illustrated catalog and price list—and tell me more about the profit-making Thrush System.

Name _____

Address _____

H A THRUSH & CO.
Peru ~ Indiana

THRUSH SYSTEM
OF HOT WATER HEATING



For Six Years

The Choice of Leaders for

Thermodine Unit Heaters in one of the large eastern silk mills.

Thermodine Unit Heater No. 701—equivalent of nearly 2-tons of cast iron radiation.

Application of Thermodine Unit Heaters for industrial drying.

SEASON after season through the past six years, Thermodine Unit Heaters have been proving their outstanding superiority for heating all sizes and types of industrial buildings.

They have won the confidence of industrial users—they have commanded the respect of the architectural and heating world — they have shown those who said "they came from Missouri" that here actually is a better method of heating.

With the great variety of heating equipment on the market today—the architect and heating contractor cannot stop with consideration of the product alone. They should look behind the product—to the policies, the service, the financial responsibility of the company producing it.

A broad service policy necessitates a financially responsible company. Prompt and efficient cooperation is dependent upon a nation-wide organization. And the ability to spend time and money in research and development is confined to a few.

The capacity of the Modine Company to faithfully fulfill the above qualifications has undoubtedly been as much responsible for the unqualified success of the Thermodine Unit Heater as the excellence of the heater itself.

ThermoDine Unit HEATER

A MODINE Product

FOR STEAM OR HOT WATER HEATING SYSTEMS

a Real Success

Industrial Heating or Drying

Back of your selection of Thermodine Unit Heaters for any industrial heating or drying installation is 16 years of study and research of the special problems of heat transfer. Thirty-five sales offices, strategically located over the country insure most efficient service. Competent engineers will study your requirements and make sound recommendations.

All the great resources behind the Modine Manufacturing Company protect your reputation when you specify Thermodine Unit Heaters—the advanced type of heaters that will deliver heated air down to working levels and keep it there—that suspend from the steam line up out of the way — that are easily and quickly installed — that give new flexibility and better control of heating than ever before has been known.

Let us tell you of the many advantages of this new method of industrial heating and drying. Learn why Thermodine Unit Heaters were chosen by the following organizations:

THE FORD COMPANY
AMERICAN CAN COMPANY
NASH MOTORS
BUCYRUS COMPANY
JOHN B. STETSON HAT CO.
MAYTAG COMPANY
COMMONWEALTH EDISON CO.

Write today for complete information.

MODINE MANUFACTURING COMPANY
1707 Racine St. *(Heating Division)* Racine, Wis.
Branch Offices in all large cities

Recessed Thermodine Unit Heater No. 501 —Replaces 500 sq. ft. of cast iron radiation. Quiet in operation. Ideal for churches, auditoriums, large salesrooms, etc.

Thermodine Utility Heater No. 101—replaces 90 to 100 sq. ft. of cast iron radiation. Ideal for offices, shops, private garages, etc.

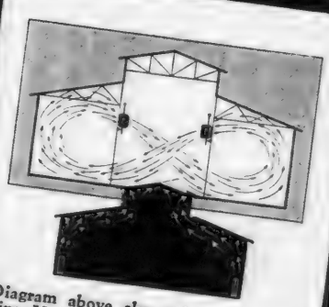


Diagram above shows how Thermodine Unit Heaters deliver heated air down to working levels and keep it there. Below — uncontrolled circulation with cast iron radiation.

ThermoDine Unit HEATER

A MODINE Product

FOR STEAM OR HOT WATER HEATING SYSTEMS

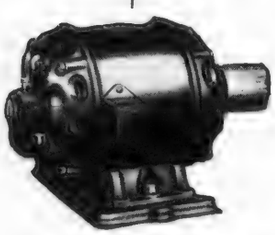
5 Horse Power Century Type RS
Repulsion Start Induction Single Phase Motor

Century

Proved Reliability

For more than 24 years Century Type RS Repulsion Start Induction Single Phase Motors have given daily proof of their reliability in all classes of service in all parts of the civilized world . . . They are widely used in all installations requiring high starting torque and low starting current—such as electric refrigerators, oil burners, house pumps and similar apparatus . . . The brushes last—they touch the commutator only during the starting period, about 1/900th part of the time the motor is operating . . . Bearings are long lived—they are machined from phosphor bronze castings, the best bearing material obtainable . . . The windings are thoroughly insulated and are then saturated with insulating varnish. This preserves the insulation and protects the windings . . . Dampness does not affect them.

Built in standard sizes from 1/8 to 40 horse power.



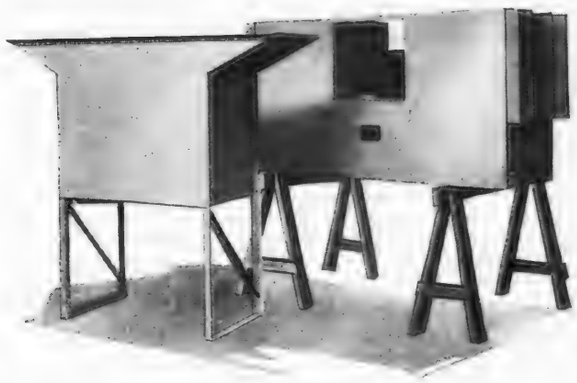
At least one year's continuous 24-hour-per-day operation, without reoiling, is assured by the Century Wool-yarn System of Lubrication, standard on all 1 horse power and smaller frame sizes.

CENTURY ELECTRIC COMPANY
1806 Pine St. St. Louis, Mo.
33 Stock Points in the United States and more than 50 outside thereof

Century MOTORS

"THEY KEEP A-RUNNING"

NOW Shipped Completely Assembled



TWINFAN
UNIT HEATERS

TWINFAN Unit Heaters are now shipped assembled in just two units. All that is necessary for installation is to place one unit on top of the other and bolt together. Steam connections have been greatly simplified. There is only one steam supply and only one return connection required, except in the large Heaters Nos. 77 and 102, which require two connections.

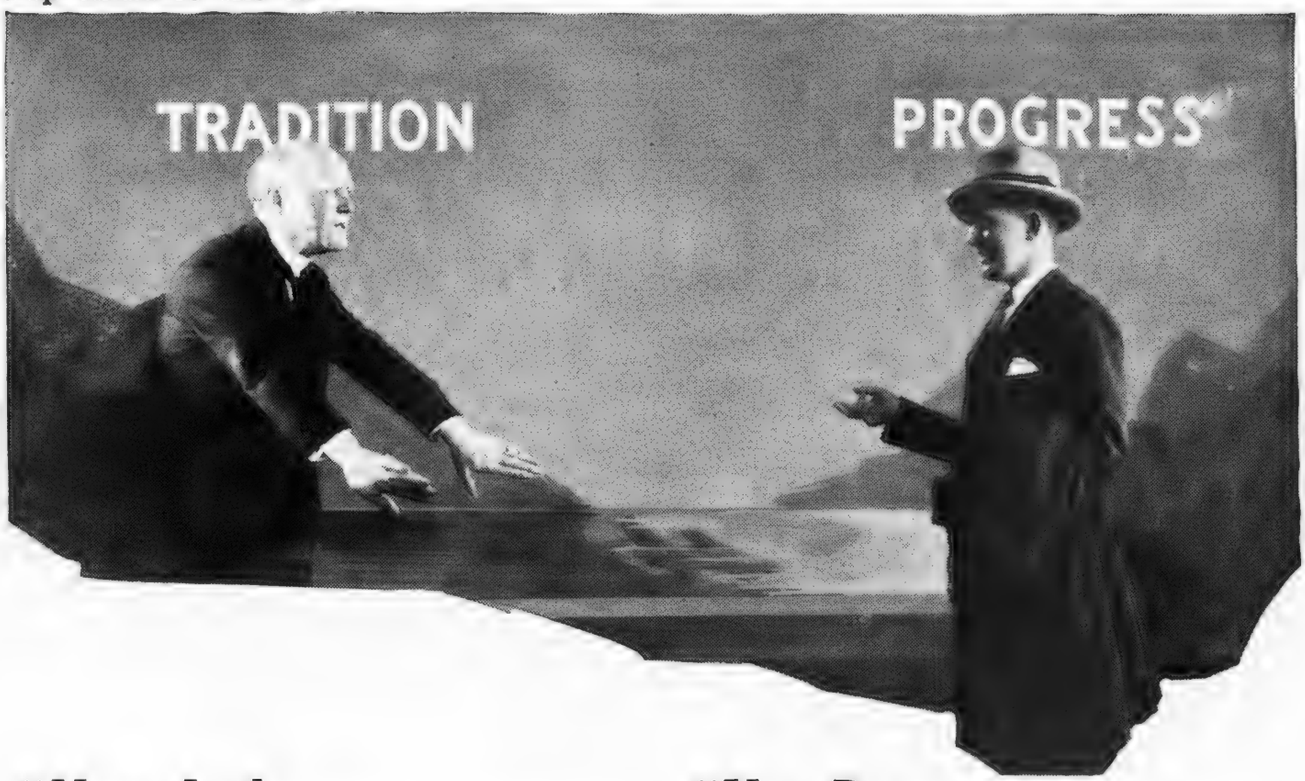
A more detailed story of the improvements and refinements made in this new TWINFAN Heater is found in our Bulletins Nos. 201 and 202, which we will be pleased to send on request.

At right is shown a Twinfan Unit Heater suspended from a brick wall. It rests on an angle iron and the top corners are supported by strap hangers. All supports are bolted to the unit and attached to the wall by lag screws.

DWYER EQUIPMENT CO.
4534 W. NORTH AVE. CHICAGO, ILL.

HEAT WITH TWINFAN UNIT HEATERS

Pop turns to the law



"Here, Lad—

I've decided against 'Linc-Weld.' You ought to know here and now that I may have been sold by a preponderance of sales effort put on me by the big electric companies . . . but, you know, business goes where it is invited . . . that's a business law."

"Yes, Pop—

but it stays where it is well treated . . . and that's good home logic as opposed to legal coldness.

I've watched the factories around here that have to depend absolutely on good motor performance for continuous production.

They've turned from one motor to another until they got 'Linc-Weld' motors installed.

Now they're all set—because of the service they get *from the motor*.

The 'business law' companies you mention stick very lawfully to old-time standards and *talk* a good line of service.

The 'Linc-Weld,' by its double size shafts and bearings, super-insulation, steel construction in place of cast iron, holds its customers because it treats production like a Mother—instead of Mother-in-law."

The Lincoln Electric Co., Dept. No. 16-4, Cleveland, Ohio

M-12

"Linc-Weld" LINCOLN MOTOR

The same factor that made this $35,000 saving will cut your heating costs, too ~~ That factor is Skinner *engineering*

On one heating job in Chicago, Skinner Engineers cut the installation cost to $50,000, when the next-to-lowest figure was $85,000.

And that was not an unusual case. Skinner Engineers can show *you* how to make a similar saving. Whether called in first or after everyone else has made their estimate, their

Unusually Thoro Knowledge of Heating, Developed thru Years of Experience

has enabled them to reduce installation costs from 20 to 40 per cent in practically every instance.

Thirty-four years ago the Unit Method of industrial heating was originated by Henry Baetz, now Skinner Brothers' Chief Engineer. Since then Skinner Engineers have been accumulating a tremendous store of heating information. On each of the Skinner installations they have encountered a different condition—added something new to their knowledge of heating.

No wonder they know how to apply the simple principle of the Skinner Heater to give you by far

the most effective heat with the least outlay of money

First, Skinner Engineers save you money on the *design and installation* of your heating units. Their wide experience has trained them to find every possible place to save material and labor in the installation. Then, Skinner Heaters save you money on *heat*. Specially designed fans pass the air thru a nest of steam coils, then distribute it evenly over the entire "work-area". That means a *direct saving in fuel costs*—that heat is not wasted *above* the "work-area" where no production is going on.

With the uniform heat distribution that is accomplished by the Skinner System, all of your producers work under like conditions—none are overheated—none are chilled. In the long run, this gives you your *biggest return*. Tests have shown that production increases or falls off directly in proportion to the comfort of the workers.

Call in a Skinner Engineer. Whether your plant is large or small, it is practically certain that he can show you how to make a *real saving* on your heating.

Main Office:
1450-90 S. Vandeventer
St. Louis, Mo.

New York Office:
1710 Flatiron Bldg.

See phone book for branches in:

Cleveland	**Washington**
Buffalo	**Kansas City**
Detroit	**Pittsburgh**
Seattle	**Baltimore**
Chicago	**Philadelphia**
Boston	**Indianapolis**

Factories at St. Louis and Elizabeth, N. J.

MAIL COUPON TODAY

Skinner Bros. Mfg. Co., Inc.,
1450-90 S. Vandeventer
St. Louis, Mo.

I am interested in:

- ☐ Heaters
- ☐ Ventilators
- ☐ Dryers
- ☐ Dust Collectors
- ☐ Light Weight Heaters
- ☐ Direct Fired Heaters

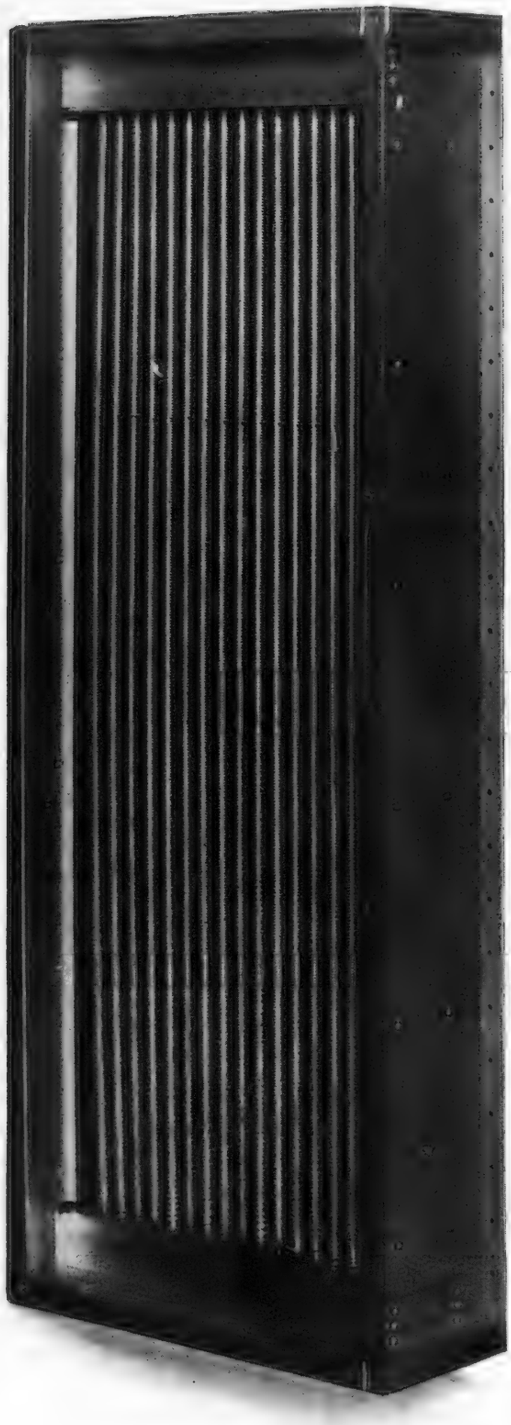
Name _____

Address _____

_____ H3

Skinner Brothers *Engineered* Heating

Originators of the Unit Method of "Work-Area" Heating



Back of AEROFIN

the pioneer non-corrosive heat-transfer Surface, is the enabling experience of more than five years.

By this half-decade does **AEROFIN** lead! In design and in manufacture!

AEROFIN, Low and High Pressure, —products of actual experience intensively utilized!

Whatever you've wished for in a Fan System Heat-transfer Surface you'll find in Aerofin!

Are these valuable Publications in your files?

Low Pressure Aerofin Bulletin No. 8, 64 pgs., containing complete descriptive and Engineering Data together with 18 Piping Diagrams in four colors covering all applications and representing the coordinated experience of America's foremost Engineers.

High Pressure Aerofin Bulletin H.P.-2, containing complete descriptive and Engineering Data together with large Temperature Effects Chart on linen.

Either or both of these Bulletins sent gratis to recognized firms or individuals upon request.

AEROFIN CORPORATION

Burnham Building
CHICAGO

750 Frelinghuysen Avenue, NEWARK, N. J.
39 Cortlandt Street, NEW YORK

Oliver Building
PITTSBURGH

LOW PRESSURE AEROFIN
For pressures up to 50 lbs. Tube-plate Construction

Aerofin is sold only by Manufacturers of nationally advertised Fan Heating Apparatus

HIGH PRESSURE AEROFIN
For pressures from 25 to 350 lbs. Continuous Seamless Tubes

a Complete Heating system~

for any type or size of installation from One Manufacturer

REGARDLESS of size or type of heating installation—the Milwaukee Valve Company has systems and specialities that work economically and efficiently.

Heating engineers and contractors know from experience that they can build prestige and make profits with Milvaco equipment. One manufacturer—one guarantee, means satisfaction to all.

For 27 years the Milwaukee Valve Company has also been specializing in the manufacture of the unexcelled line of "Milwaukee" standard brass valves, packed type radiator valves, gate, globe, angle, check valves, etc

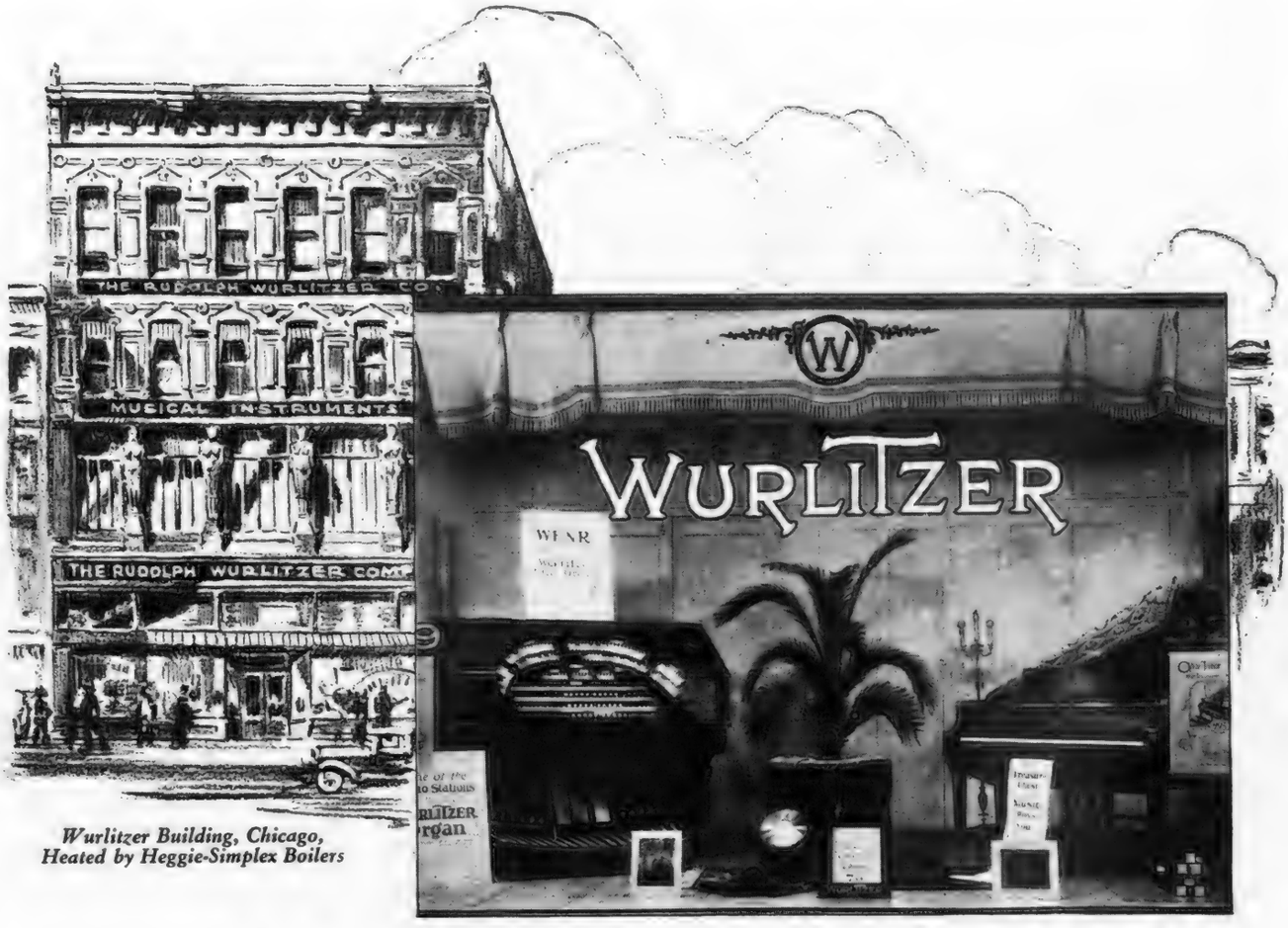
Write for complete information

Dept. B

MILWAUKEE VALVE CO.

MILWAUKEE, WISCONSIN

OFFICES IN ALL PRINCIPAL CITIES



Wurlitzer Building, Chicago,
Heated by Heggie-Simplex Boilers

Where Buying is Based on Pre-Determined Standards

OUTSTANDING business success is as much a matter of scientific buying as scientific management of production and sales. Among the great corporations who recognize this fact and whose buying is always based on pre-determined standards, Heggie-Simplex Steel Boilers enjoy an ever-increasing preference as the most modern of heating boilers for modern buildings.

Heggie-Simplex Boiler Co., Joliet, Illinois. Representatives in principal cities — telephone and address listed under "Heggie-Simplex Boiler Company."

HEGGIE-SIMPLEX

ELECTRIC-WELDED STEEL HEATING BOILERS

The Heating and Ventilating Magazine

VOL. XXV

Reg. U. S. Pat. Off.
Reg. Canadian Pat. and Copr't Off.

No. 4

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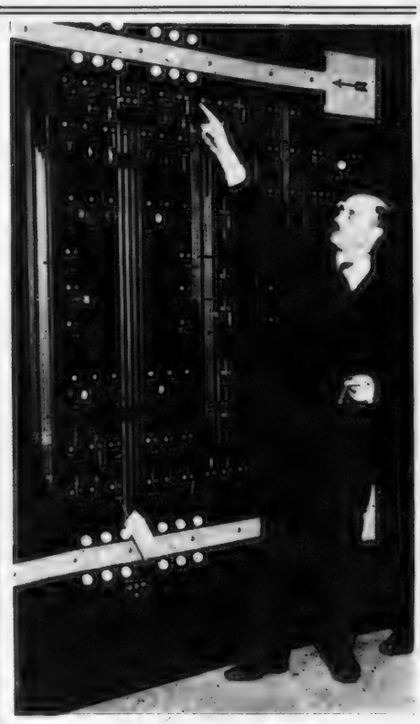
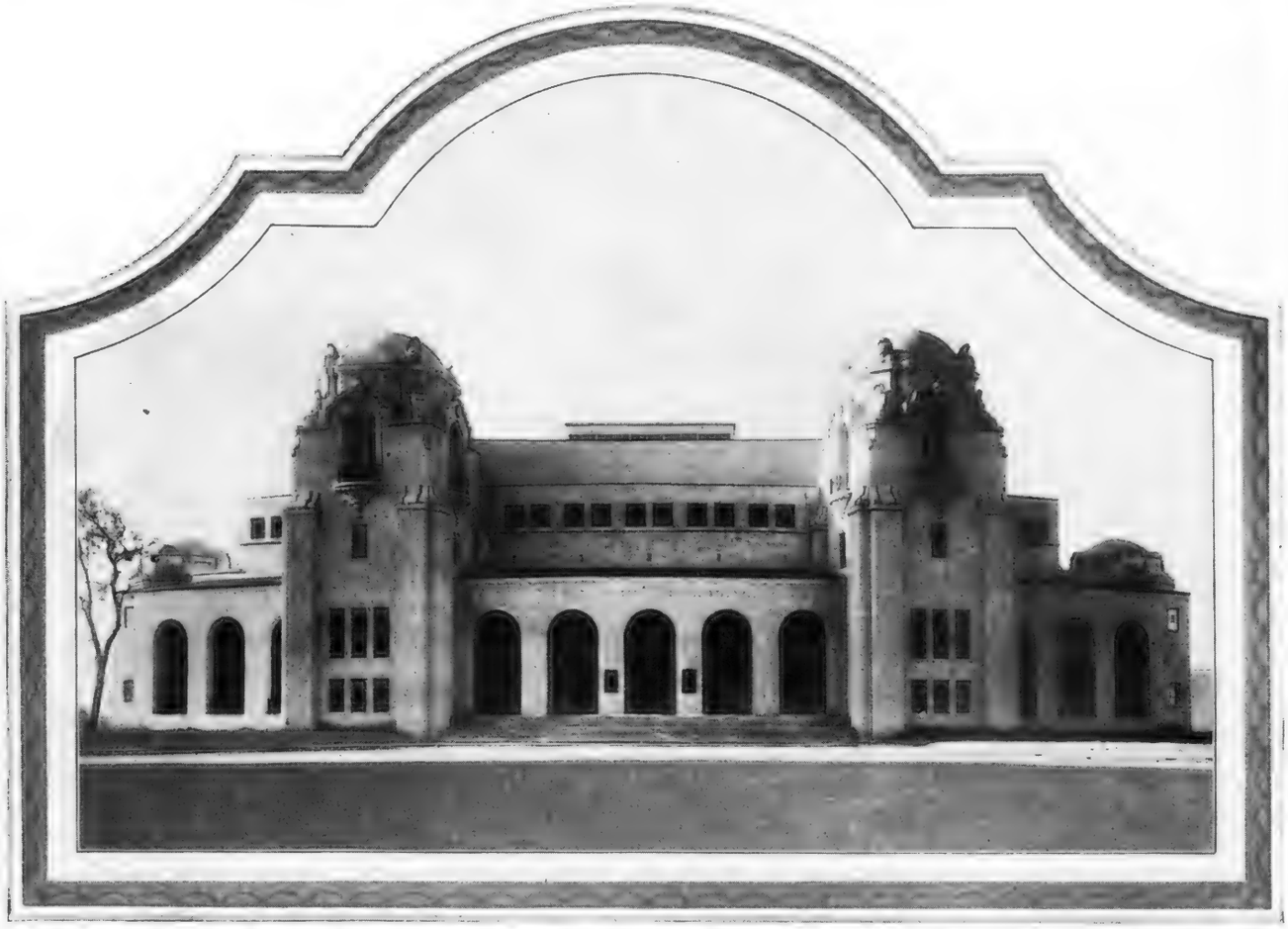


From Vagaries to Facts

WE recall the comment of some wag that if only we could color bad air it would require no argument to prove the value of mechanical ventilation. More recently, in discussing "comfort ratings" of radiators, the idea has been expressed that all our ventilation problems would be solved if we could find a way to make warm air heavy and cold air light.

Vagaries, to be sure, but not such a far cry from the "electric noses" which have been devised to detect the quality of the air in the Holland Tunnel. Not only do these "electric noses" indicate the carbon monoxide content of the air at various points at a given time, but record it so that a check can be made as to whether it is increasing or decreasing. It is all done through the use of a chemical, the temperature of which is affected by carbon monoxide, operating a thermostatic element which varies the resistance in a circuit from the control room. The recording pens show the current variation and, consequently, the carbon monoxide content.

A. V. Armagnac



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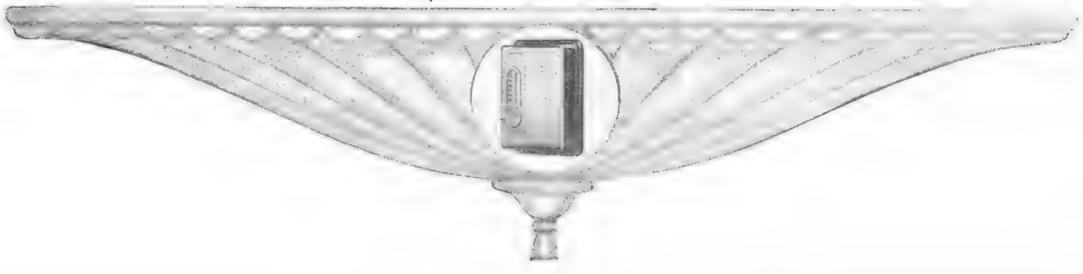
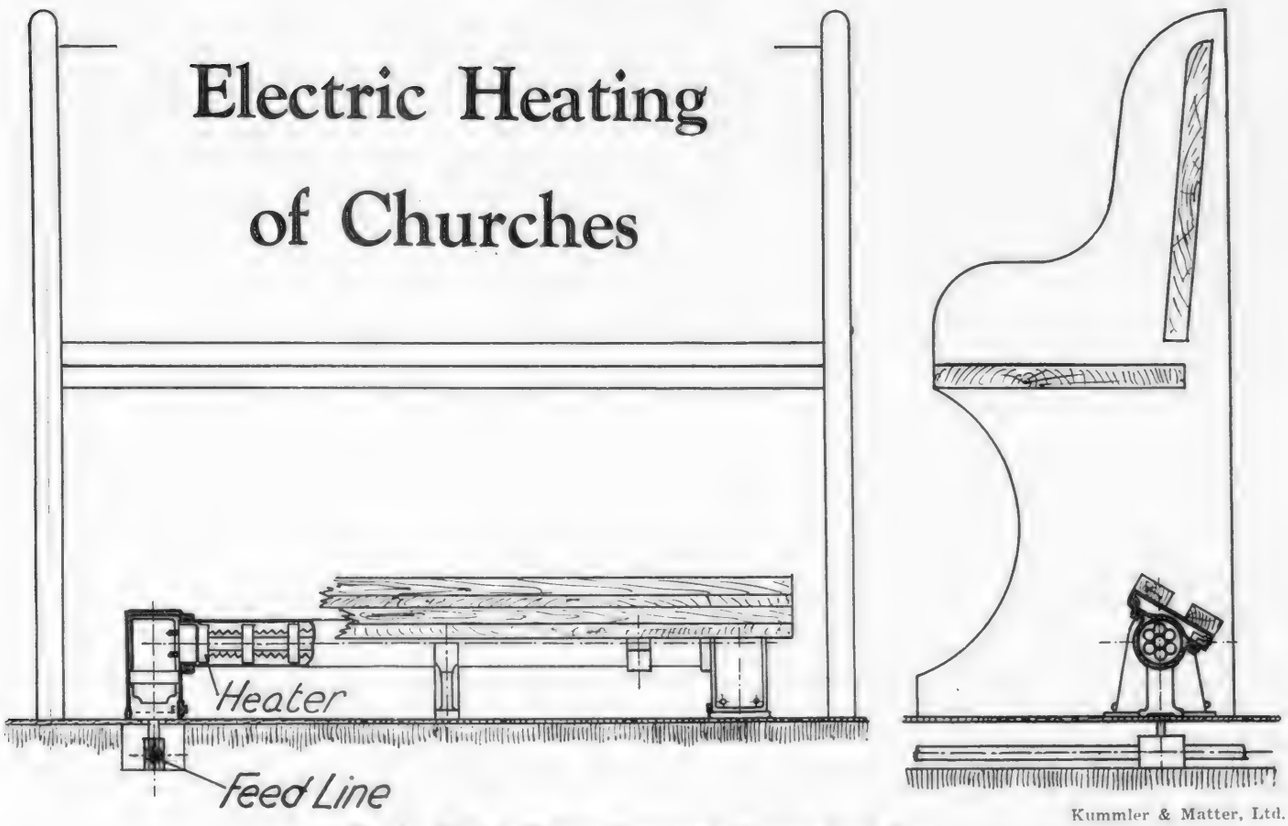


The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

APRIL, 1928

Electric Heating of Churches



Kummler & Matter, Ltd.

Fig. 1. Electric Heaters Underneath Footboards of Pews

Typical Methods, Both of the Direct Type and Combining Electric Heaters with Steam and Warm-Air Systems

By William Sommer

ELECTRICITY unquestionably would be the ideal energy for heating purposes, due to its cleanliness, absence of chimneys, etc., if it were not for its high cost. How little electric heat can be purchased for $1.00 compared with other fuels, is shown in an authoritative statement in THE HEATING AND VENTILATING MAGAZINE for January, 1927:

	B.T.U. per dollar
Coal	3,375,000 to 1,795,000
Oil	2,421,000 to 1,141,200
Gas	2,000,000 to 765,000
Electricity	341,500 to 227,500

The high price of the electric current generated in the ordinary steam-driven power house is justified by its nature as a second-hand heating energy.

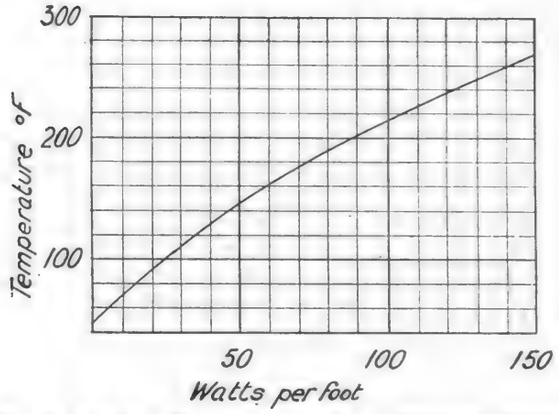


Fig. 2. Surface Temperatures of the "Therma" Heater

The hydro-electric power station yields electricity as a first-hand heating energy and makes its application a worthwhile proposition. But it is a fact that even in countries with ample water power resources and not a single coal mine worth while, as, for instance, Switzerland, electricity is from three to five times as expensive as heat from coal.

This leads to the conclusion that electricity for heating purposes will always be limited to exceptionally favorable objects. It will never be applied to home heating on a large scale nor will there be enough water power available, even with all hydro-electric possibilities fully utilized, to cover the total of the heating demand.

When we summarize the customers of electric heat as they exist to-day and eliminate industrial users needing it for their special processes, we might think of all those practical household applications of electric heat, such as ironing, cooking, laundering, etc. All of them are similar to our own problem, the electric heating of churches, in so far as they dispose of the heat exactly where and when it is needed, and as they all are intermittently-heated objects, needing very little attention.

CHURCH HEATING AT OFF-PEAK PERIODS

There is one more argument in favor of church heating by electricity in regions abounding in water-power resources: The time when churches—at least Protestant churches—have to be heated

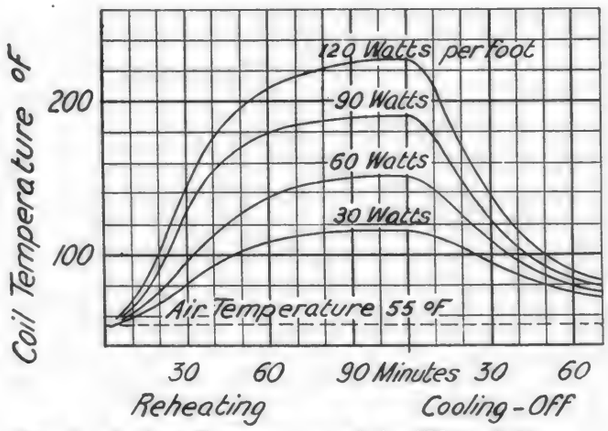


Fig. 3. Surface Temperatures of the "Maxim" Heater

generally lies off the peak load of the hydro-electric plant; this enables the customer to take advantage of so-called surplus energy at a favorably-reduced price.

Moreover, night current might be had at a considerably lower price than day current, and, by the additional installation of a storage tank, may make electric heating possible in places where an uneconomical proposition resulted by using day current.

If church heating, despite the serious drawback of the expensive current, is gaining ground, it is for the following reasons:

1. The heat can be carried right where it is

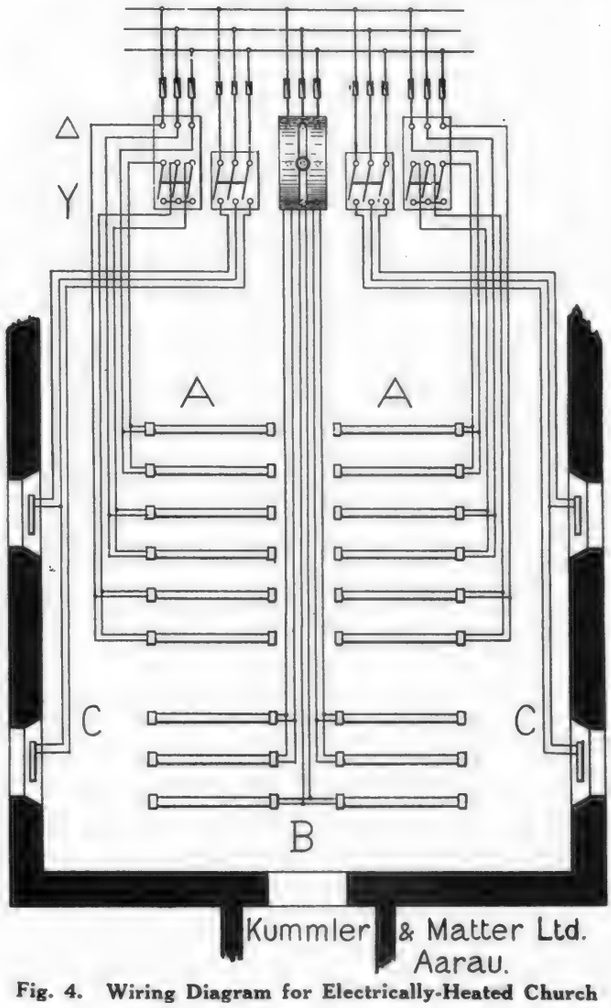


Fig. 4. Wiring Diagram for Electrically-Heated Church

needed, i.e., to the feet of the occupants, without any distribution losses.

2. The heat can be turned on or off instantaneously. This makes it ideal for intermittently-heated buildings, such as churches.

3. The heating plant can be handled by any person without special training or manual labor and is a clean proposition.

It is common practice to install the electric heaters underneath the footboards of the pews. The heat thus is carried right to the feet of the occupants and utilized with the highest possible efficiency, justifying a low average room temperature.

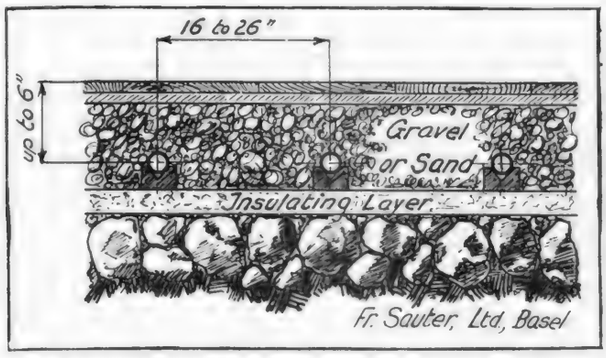


Fig. 5. Cross Section of Electrically-Heated Floor

European practice calls for only about 55° F. for this particular system; herein lies its economy. Some other heating systems reheat the auditorium "from top to bottom" whereby a tremendous waste of heat takes place in the upper parts of the room, and a correspondingly high average air temperature is needed to produce comfortable conditions for the audience.

The heaters generally consist of a continuous piece of pipe of about 2 in. to 3 in. size in which the heating elements or resistance coils are imbedded and properly insulated. A representative construction of this type is shown in Fig. 1. The ends of the heating elements are connected to the distributing cables carried in floor ducts along the aisles.

Purely electrical heating of this kind is used especially for churches which are heated only on Sundays and on special occasions. The majority of them are intermittently heated. The electric radiators, therefore, besides carrying their normal load, have to meet the additional requirements for reheating. This is done by raising their capacity to its maximum and the surface temperatures correspondingly up to about 220° to 250° F.

With respect to the economical results it is good practice to figure the total radiation on the basis that the church has to be reheated in not more than about 5 to 7 hours under severe weather conditions.

Extended reheating with scant radiation installed has proven less economical than short reheating with ample radiation. The highest coil temperatures serve for reheating only; when the temperature of the interior is up to normal, which with this system is about 55° F., the heating effect is cut down to a fraction of the maximum capacity, with corresponding coil temperatures of about 120° to 140° F.

Fig. 2 shows the relation between the surface temperatures of the "Therma" heater and its electric capacity. Fig. 3 shows how long it takes to bring the "Maxim" heater up to temperature applying various intensities of the electric current expressed in watts.

A typical wiring diagram of such an installation for a small church is represented in Fig. 4. There are five independent groups branched off the feed line: two groups A for the major part of the nave, one group B for the back part of the nave and two groups C for the window radiators which check the cold draft from the large glass areas.

Groups A and B are fitted with special star-triangle switches in such a way that triangle position subjects the heating elements to the maximum tension, while star position reduces the load to about one-third for maintaining the interior at the desired temperature. The window groups C are not used for reheating, due to economical reasons. They are turned on only as soon as services begin, and are fitted with simple cut-out switches.

ELECTRIC FLOOR HEATING SYSTEM

In churches which are open all week and where it is necessary to keep the heat on continuously, as in Roman Catholic churches, the electric coils might be imbedded into the floor and the heating surface entirely concealed, as shown in Fig. 5. It is self-evident that such a system lacks the flexibility of the open-coil system as regards its adaptability to changing weather conditions; from this point of view it might not be as efficient as open coils. An electric floor-heating system under construction—though not in a church—is shown by Fig. 6. As in any floor-heating system, careful attention has to be given to the surface temperature of the floor. While a temperature of not more than about 82° F. is recommended for floors on which people have to stand for several hours, a temperature up to about 95° F. might be admitted for churches.

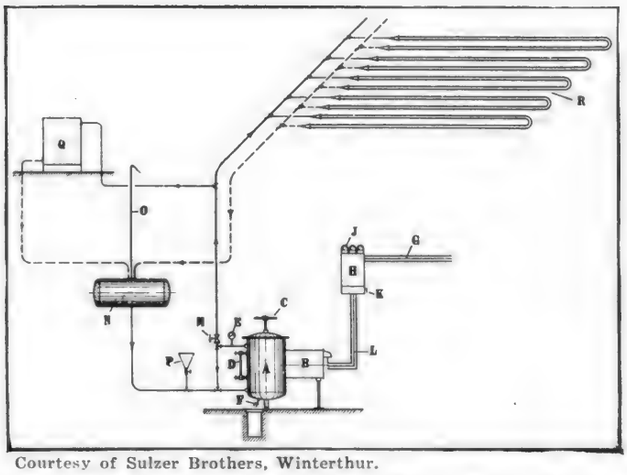
ELECTRIC HEATERS COMBINED WITH STEAM OR WARM-AIR SYSTEMS

The electric coils of the purely electric system can be substituted by steam coils which are located underneath the pews in exactly the same way as the electric coils, while steam is produced by an electric boiler, as shown in Fig. 7.

This scheme, might be just as effective and cost less than the purely electric system; moreover, it permits the use of high-tension current, thus eliminating special transformers between the public

Courtesy of E. Egli, Zurich.

Fig. 6. Electric Floor Heating System Under Construction



Courtesy of Sulzer Brothers, Winterthur.

Fig. 7. Electric Boiler Connected to Steam Heating System

A. Electric boiler.
B. Space for electrodes.
C. Hand regulation.
D. Gage glass.
E. Pressure gage.
F. Drain.
G. Feed line.
H. Switch box.
J. Amperemeter.
K. Hand switch.
L. Boiler-feed line.
M. Valve.
N. Equalizing tank.
O. Air vent.
P. Fill funnel.
Q. Radiator.
R. Coils underneath footboards.

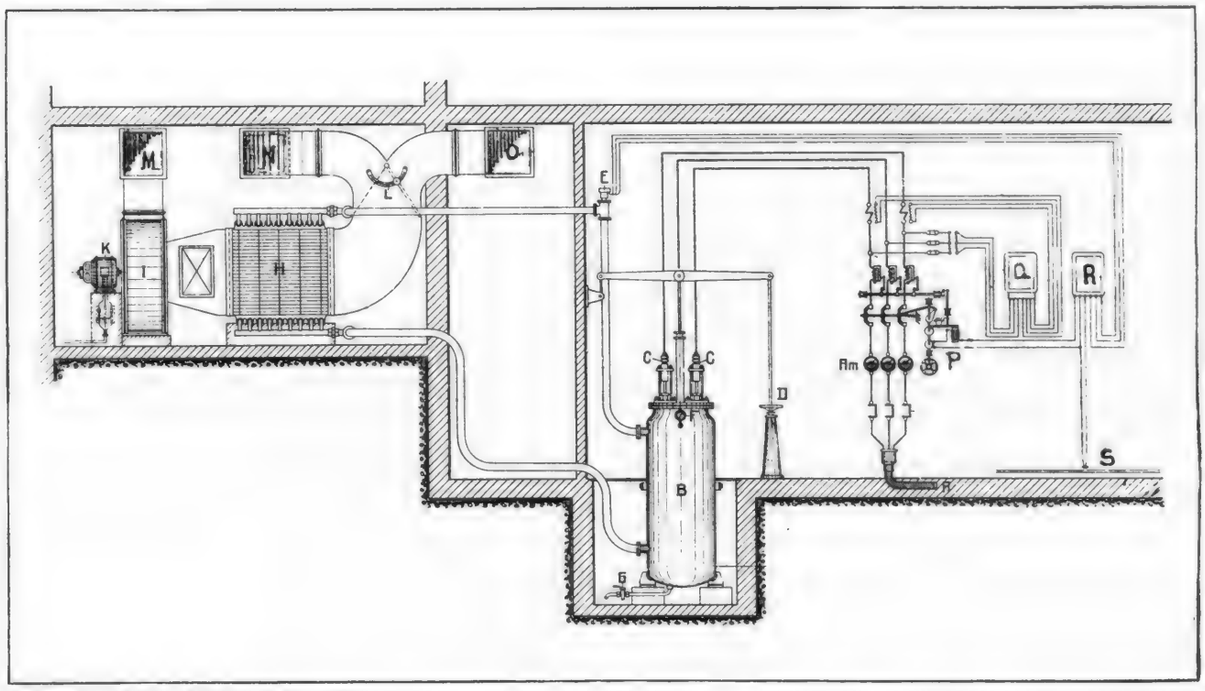
utility high-tension net and the boiler. The latter might be of the resistance type, using voltages up to 500, or of the electrode type using tensions up to 3000 volts and higher. The possibility of installing a coal boiler as standby unit in parallel with the electric unit is one more advantage of this combined steam-electric system.

STEAM GENERATION WITH SULZER ELECTRODE TYPE BOILER

The particular Sulzer boiler represented in Fig. 7 is of the electrode type. The amount of heat conveyed by the current to the water is controlled by regulating the water level and the consequent immersion of three plate-electrodes located in the box B. This is done by means of the handwheel C by which a closed float inside the space A is raised or lowered according to the output desired. The tank N, besides serving as a receiver and pressure-regulator during normal operation, also acts as a safety device by receiving most of the boiler content in case of excessive pressure, and thus leaving the electrodes nearly dry.

Fig. 8 shows an electric warm-air combination system by Sulzer Brothers in which the heat from the boiler to the Vento unit is carried by means of hot water. The boiler is of the 3000-volt electrode type. While the three electrodes C are fixed, regulation is effected by changing the position of three insulating tubes surrounding the electrodes. This shortens or lengthens the path of the electric current through the water with ensuing change of the heat output.

(Translated from an article in *Gesundheits Ingenieur* on "Electric Heating of Churches" by Max Hottinger, consulting engineer and professor of Heating and Ventilating at the Federal Polytechnical University at Zurich, Switzerland. Illustrations by courtesy of Swiss manufacturers as indicated.)



Courtesy of Sulzer Brothers, Winterthur.

Fig. 8. Electric Boiler Connected to Fan Blast Heating System

A. Feed line.
B. Electric boiler.
C. Electrodes.
D. Hand regulation.
E. Hot water thermostat.
F. Thermometer.
G. Drain.
H. Vento heater.
J. Centrifugal fan.
K. Electric motor.
L. Damper.
Am. Amperemeter.
M. Warm air.
N. Recirculated air.
O. Fresh air.
P. Relay switch.
Q. Electric recorder.
R. Auxiliary switch.
S. Light current.

Heating a Modern Office Building

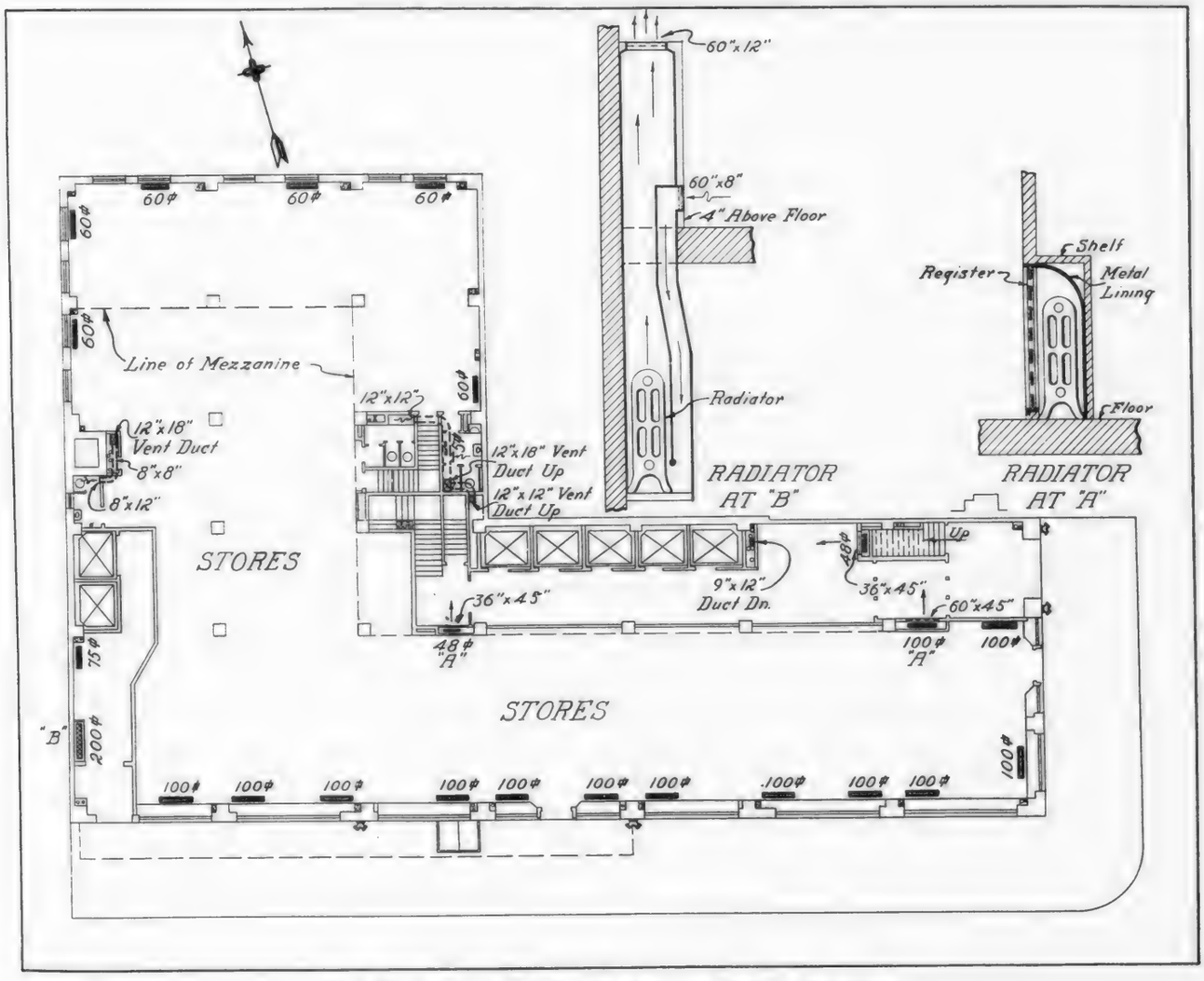
Outline of the Requirements in the New Home of The Heating and Ventilating Magazine

BOTH in its architectural design and in its construction details, the 386 Fourth Avenue Building, which houses THE HEATING AND VENTILATING MAGAZINE, is typical of present-day practice with regard to modern office buildings. Although classified as a loft building, it is devoted entirely to business offices. Each floor is left free of partitions until rented. Dividing walls of plaster block are then built to meet the requirements of the individual tenants.

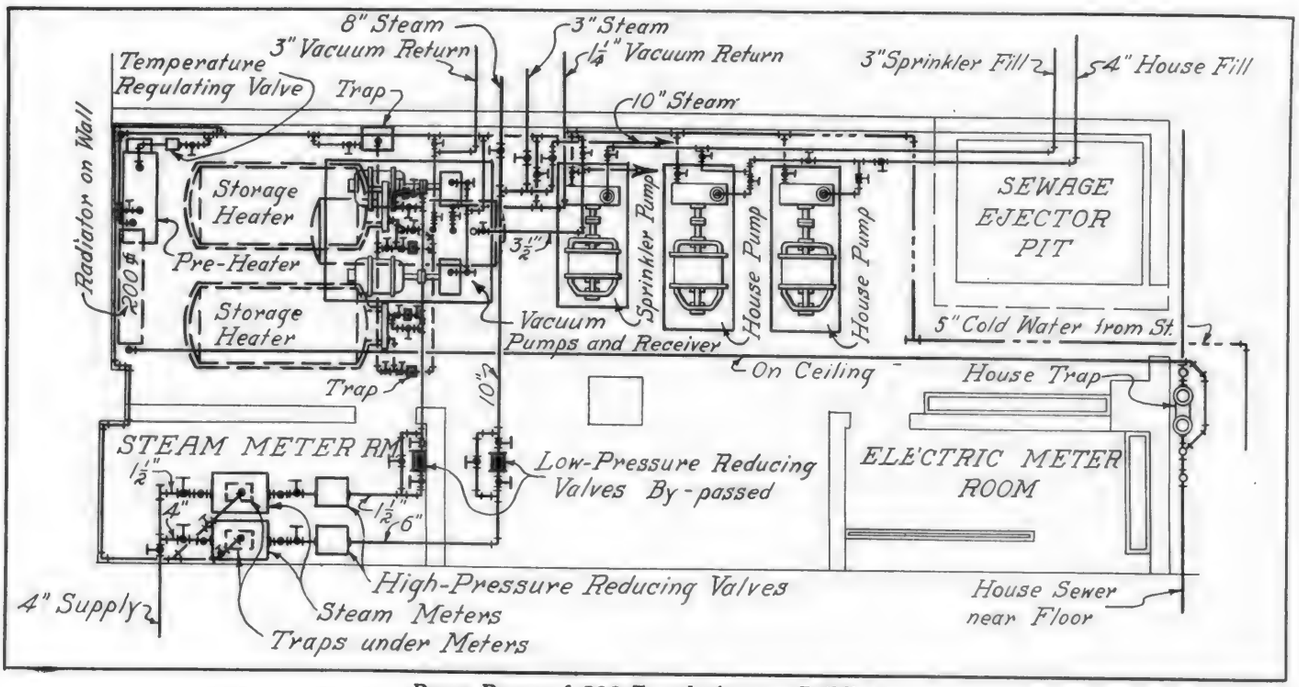
The building contains 20 stories and basement, with a mezzanine floor in the first story. Set-backs from the building line occur at the 18th and 20th floors. A double-decked pent house at the roof contains the house supply, fire-line supply, sprinkler gravity and pressure tanks, elevator machinery and exhaust fans.

Steam is supplied through a 4-in. connection at a pressure of approximately 100 lbs. per square inch from the mains of the New York Steam Corporation on 27th Street, and connects with the heating system through Kieley and Mueller reducing valves at a pressure slightly above atmospheric. A separately-metered 1½-in. branch from the service connection supplies steam reduced to 20 lbs. per square inch pressure to the water storage heaters. The latter branch only is in use during the non-heating season.

A two-pipe, up-feed, low-pressure vacuum return system heats the building, the radiators being



First Floor Plan—386 Fourth Avenue Building, New York

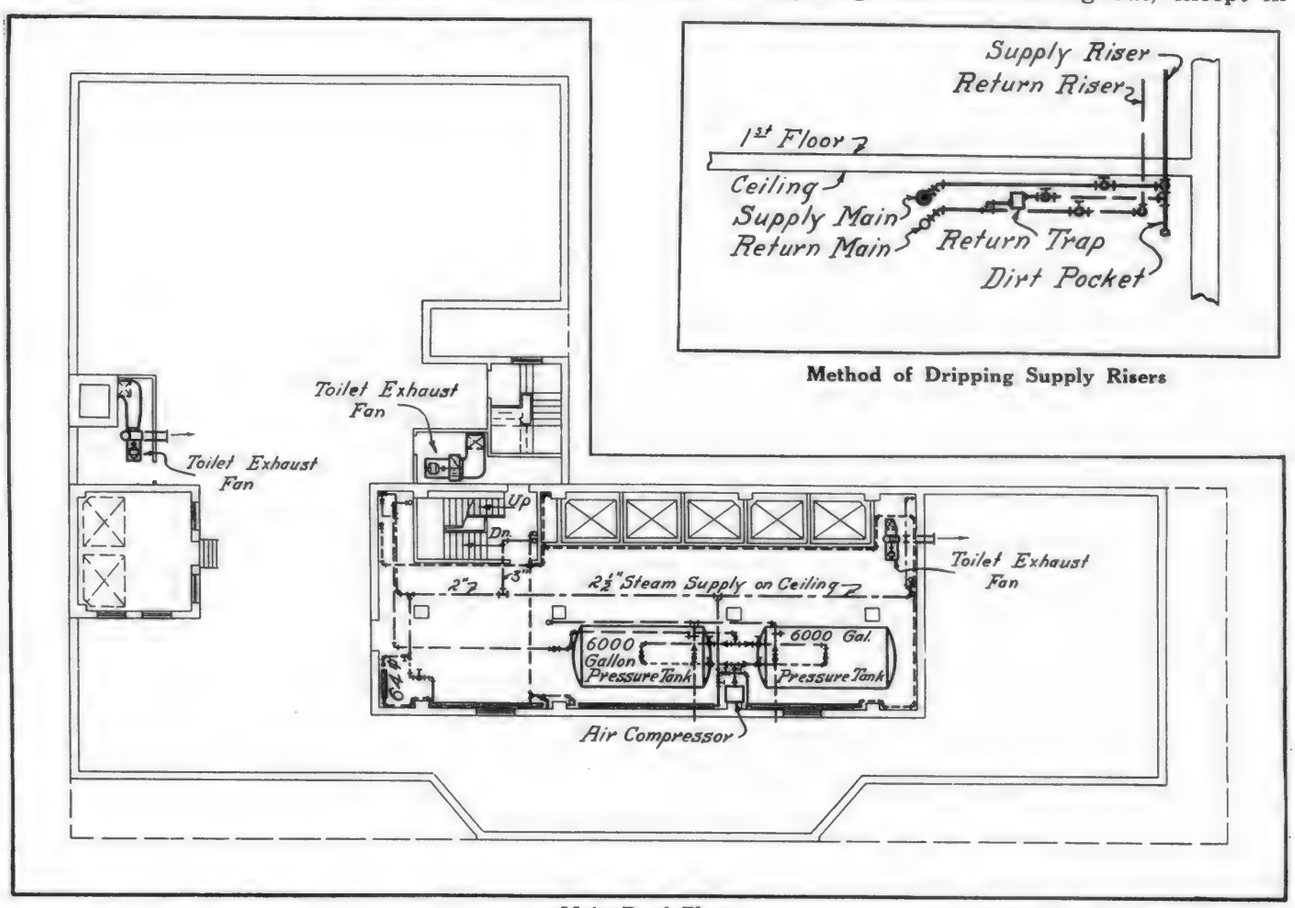


Pump Room of 386 Fourth Avenue Building

equipped with Marsh lever-type regulation supply valves and Sarco radiator traps. The supply mains are hung from the ceiling of the basement, a separately-valved branch being taken near the reducing valves to supply the pent house. The vacuum return mains in general follow the runs of the supply mains. Drip connections are taken from the heels of the supply risers and at other drainage points in the mains and these discharge through return traps into the vacuum return mains. These drip connections are horizontal and are not insulated.

There is approximately 28,000 sq. ft. of radiation in the building. Radiators of the Corto pattern on high legs are used throughout, except in

Method of Dripping Supply Risers



Main Roof Plan

the pent house where mitred pipe coils are installed. All radiators are exposed but those in the entrance vestibule and hall are concealed behind grilles. Branch connections supplying radiators are run above the floors, return connections being run at the ceilings below, as close to the slabs as possible. This arrangement minimizes the unsightliness of piping exposed at ceilings. According to fire insurance requirements all sleeves surrounding risers and radiator branches which pass through the floors extend 3 in. above the finished floors.

In general the risers are anchored at the 3rd, 10th, and 17th floors. They are provided with brass slip-type expansion joints at the 6th and 13th floors.

HOW THE CONDENSATION IS HANDLED

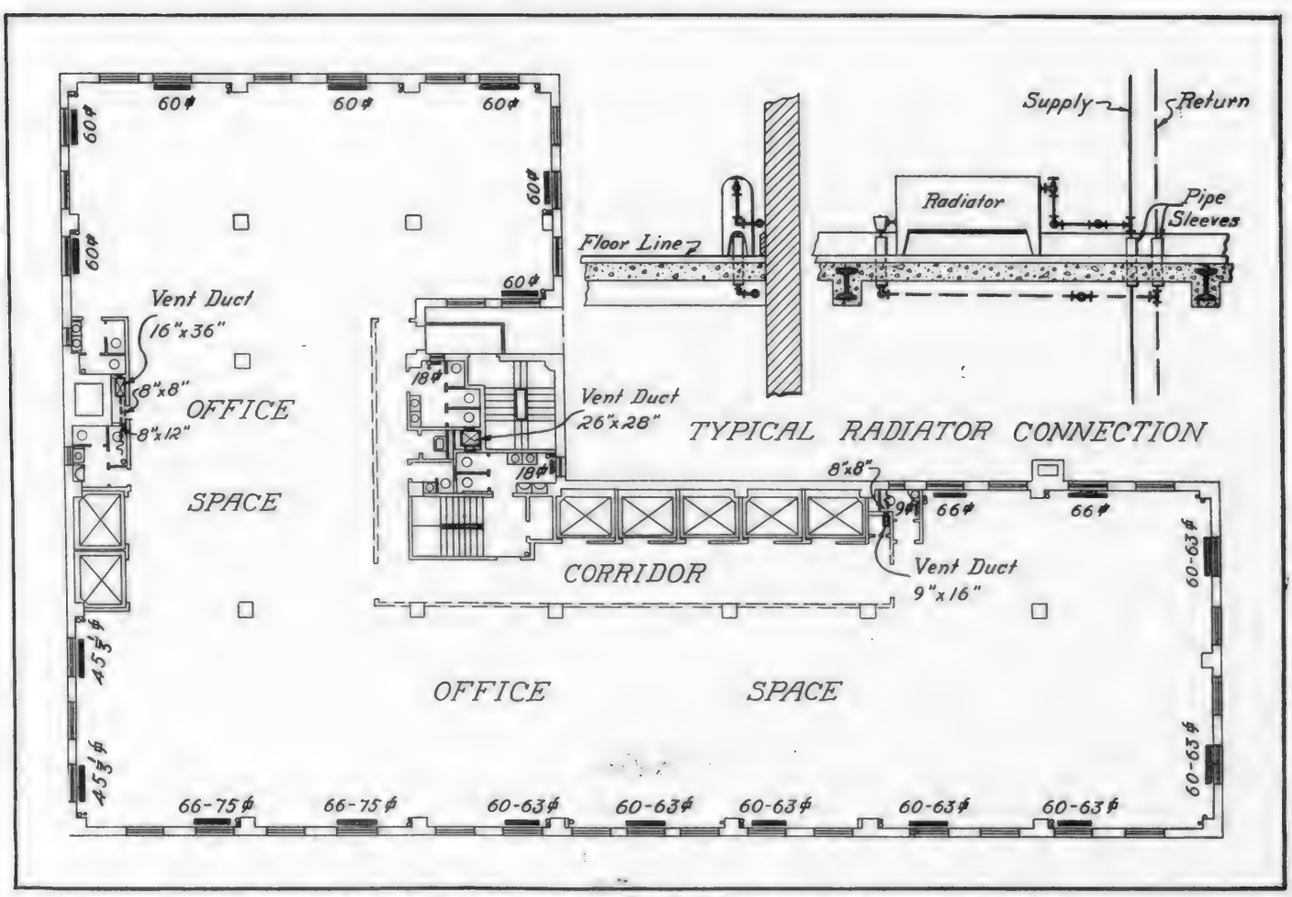
Condensation returns are discharged into the street sewer by means of a Jennings Hytor return-line vacuum-pump. This duplex unit, of the manifold type, is driven by a direct-current motor provided with automatic control. On their way to the sewer, the returns pass through a Patterson-Kelley preheater which serves to preheat the domestic water supply before it enters the water storage heaters and, at the same time, cools the condensed returns. Beyond the preheater these returns pass through a large radiator which, by means of sheet-metal duct work, serves partially to heat the freight entrance hall and to cool the returns still further. By means of Powers thermostatic control valves, steam is not admitted to the coils in the water storage heaters until the temperature falls below a predetermined point, thus insuring maximum use of the preheater.

Steel pipe was furnished by the Youngstown Sheet and Tube Company. Improved Asbestocel covering of Johns Manville make was applied by the Asbestos Construction Company. On all high-pressure piping 85% magnesia covering was used.

EXHAUST VENTILATION FOR TOILET ROOMS

Exhaust ventilation is provided for all the toilet rooms. Three vertical sheet-metal ducts are installed to take care of the three tiers of toilet rooms, and registers which can be locked in position are provided in every toilet room. The fans are designed to produce ten changes of air per hour in the toilet rooms and to conform to the New York State requirements. These fans are located in the pent houses at the roof, and are of the Sirocco type, driven by direct-current motors provided with Cutler-Hammer manual variable-speed controllers. Sheet-metal work was installed by the Somaron Sheet Metal Works. Korfund insulation is provided under the fans.

Almirall and Cusachs are the architects of the building. All of the heating, ventilating, automatic sprinkler, plumbing and electric installations were designed by Eadie, Freund and Campbell, consulting engineers, New York. The heating and ventilation installation was made by Wolff and Munier, Inc., New York. The owner is the 386 Fourth Avenue Corporation, of which Arthur Greenbaum is president.



Typical Floor Plan, 20-Story Office Building, 386 Fourth Avenue, New York

How Concealed Radiatio
Appearance o

Practical and aesthetic reasons for the rapidly-increasing use of concealed radiation are vividly portrayed in these pictures.

Has Transformed the Home and Office

This form of heating surface obviously is adapted to modest as well as to elaborate interiors.

Heating and Ventilation Specifications

Part II—General Conditions, Proposals, Deposits, Bonds

By Harold L. Alt

ANY other general provisions thought desirable may also be included in this section, but care should be taken that they are *general* in character and not *specific*. Care also should be taken to place all information in regard to the proposal and form of proposal in the opening paragraphs, so that, after the contract is let, these may be removed because they have no further application.

All information relating to payments, and withholding of payments, also should be kept together so that the financial features of the contract are clear and easy to grasp. In small work some of the above headings may be superfluous and can be omitted.

For the purpose of gaining an insight into the technique of various specification writers, six specifications prepared by different specification writers will be reproduced. The main points essential in specifications will be considered and the manner in which these points were handled by each writer will be compared and considered; from such information it should be possible to prepare a composite production which will eliminate all objectionable features, as far as possible, and at the same time will incorporate all the good ones found in any of the specifications under scrutiny.

The specifications selected will be referred to as No. 1, No. 2, etc.; the titles and authors are as follows:

No. 1—Specification for a high school in Wilmington, Del., by a Newark, N. J., architect and engineer.

No. 2—Specification for an office building in New York by a New York architect and engineer.

No. 3—Specification for a high school in St. Louis, Mo., by the school architect.

No. 4—Specification for a high school in Columbus, O., by a Chicago engineer.

No. 5—Specification for a New York high school prepared by the Board of Education, City of New York.

No. 6—Specification of a high school in Orion, Mich., prepared by a Detroit architect and engineer.

To make this series of articles of greater value to the reader the practice will be followed of printing all quotations from the specifications mentioned, as well as the suggested composite equivalent, in such form as to allow their removal from the magazine and the mounting on standard 8 in. x 5 in. card-index cards so that this information can be preserved for future use if so desired.

Many architects have adopted the general conditions recommended by the American Institute of Architects for use with all work, and these architects naturally desire to have the heating and ventilation specifications prepared in a manner to dovetail with the specifications for the rest of the work. In these cases the work of the specification writer is much simplified, as a paragraph such as is quoted below will not only take care of this contingency but will cover any case where an architect desires to have the general conditions of the basic contract repeated for each portion of the work not included in the general contract, or falling, as a sub-contract, under the general contract.

General Conditions

GC-1 GENERAL CONDITIONS:

The General Conditions applying to the General Contract shall also apply to this work, and to each and every sub-contractor to his Contractor whether this work is included in the General Contract or is let as a separate contract. The Contractor and his Sub-contractors on this work must carefully read said General Conditions and study the general construction plans, and proposals must include everything required to make a complete working plant, whether specifically shown and specified or not.

(Note—This is used where the general conditions of the general contract govern the other trades so that a special set of general conditions for each trade is unnecessary).

Some specification writers start their specifications with a general paragraph, often without any heading at all, mentioning the work to be done under the specification or outlining what the specification is intended to cover. This paragraph frequently is called "Scope" or "Work Included." This is not a bad idea, as it introduces the subject to the contractor and tells him immediately what the whole specification is designed to cover.

On the other hand, when the architect's general conditions are not used, it seems more logical to group the form of proposal and the details of submitting tenders at the beginning of the specification —not because of any greater importance or because of logical order, but simply because the one to nine items covered in the list previously quoted have no place in the body of the specification where they consistently can be located. So the placing of the tender and the instructions concerning the bidding may be put at the beginning and thus disposed of.

For this reason the proposal will be considered first, regardless of exactly where it may be located in the six specifications being compared, and only

the method of handling this subject will be taken up in connection with each specification. Of course, the specification writer can use his own judgment in the matter of locating the proposal and instructions to bidders in the specifications and, if it suits the particular case better in some other position, there is no objection to so altering the location. *The text, however, is important.* If the proposal is presented first it may be made to read somewhat along the line of the following:

General Conditions

GC-1 PROPOSALS:

Proposals for.....described herein, for.....addressed to .....will be received by..... until..... from contractors regularly engaged in this line of work.

Proposals must be enclosed in sealed envelope with the bidder's name and address thereon, and endorsed, "Proposal for....." Proposals received after the time stated will be returned unopened. Telegraphic proposals or modifications of proposals will not be considered. Proposals will be received only from parties who can give satisfactory reference, if required.

It is understood and agreed that the following conditions shall be a part of the specification and of any contract based on same.

Before submitting a proposal, each bidder must make a careful study of the specifications and drawings, and fully assure himself as to the quality of the material and character of workmanship required. The Contractor must carefully consider or visit the place where the work is to be performed and materials delivered, and, should his proposal be accepted, he will be held responsible for any misunderstanding or error whether it results from his failure to carry out the above or not.

The proposal for this work must cover all contingencies, including all labor and material, light, scaffolding, fixtures, tools, transportation, etc., necessary for the complete installation of everything described, shown, or reasonably implied herein and to provide for a complete system ready to operate.

Any apparatus, appliance, material or labor that may be necessary to complete the work in accordance with the intent or purpose of this specification shall be furnished by the contractor without extra cost, the same as if mentioned in this specification or shown on the plans.

No. 1 specification contains no proposal, this evidently being taken care of in an additional instrument entitled "Instructions to Bidders." No. 2 refers the reader to the general conditions of the general contract. No. 3 says that blanks will be furnished at the office of the Building Department and that all bids must be made out on these blanks. No. 4 contains no general conditions in the full sense of the word while No. 5 says that bidders are requested to make their bids on the blank form prepared by the superintendent of plant operation, copies of which can be secured by application to .....

No. 6, however, contains the form of proposal which is as follows:

Form of Proposal

To.....

We propose to furnish all labor and materials and fix in place the heating apparatus and other equipment specified in Section A for the..... building in strict accordance with the plans and specifications and the instructions of the Superintendent in conformity therewith for the following sums, it being understood that this proposal includes all mechanical equipment except that included under the Electrical and Plumbing Contracts.

Apportionment as follows:—

Alternate "A" $.....

Alternate "B" $.....

Alternate "C" $.....

We are enclosing our certified check for the amount of $.....

We will start work on the equipment as soon as the progress of the building and other equipment requires and will keep pace at all times with the construction work so as not to delay same.

Respectfully submitted,

Name .....

Address .....

From the above it may be inferred that it is not general practice to include the form of proposal in the specifications, it being either covered by a separate form or in the general conditions of the general contract to which the heating and ventilating contractor is referred. Out of the six specifications used, only one contained the form of proposal therein.

After the form of proposal has been satisfactorily disposed of, the next matter in connection with the proposal is a deposit and bond. Sometimes only a bond is required and at other times it may be desirable to include both; the deposit is usually made 2½% of the tender price and the bond 50% of the tender price. Where both are required the following form is suggested:

Deposit and Bond

GC-2 DEPOSIT AND BOND:

Each proposal must be accompanied by a certified check equal to.....percent of the amount of the bid, made payable to the Owner as a guarantee that, if the work be awarded to him, the bidder will execute, within a reasonable time, not exceeding six days from the date of the award of the contract, a satisfactory contract and bond in the form attached, to the amount of..... percent of the amount of the contract, for the faithful performance of same. Such bond shall be executed by the Contractor and a satisfactory Corporate Surety Company authorized to do business in the State of.....

(Note—Deposit is usually made 2½% and bond 50% of bid.)

(*Continued on Page* 82)

"The Next Size Larger"

"What Is the Use of Calculating Exact Pipe Diameters When We Cannot Get Pipes of the Calculated Sizes?"

By J. Blansjaar
Heating Engineer, Enschede, Holland

THE question, quoted in the above title, asked some time ago by one of your readers, is of great importance. The right answer to it was given years ago by Professor Rietschel and, in doing so, Professor Rietschel laid the foundation of all pipe-line calculations, be it for steam, water, air or industrial gases.

As an example, let us take a hot water system. Ninety per cent and more of the heating plants installed in Europe use water as a heating medium for the very good reason that it is the easiest to install, it is the simplest to operate, it gives the mildest heat, and it makes no noise at all. The only objection to it—that the radiators are too large—is obviated by the use of the new type of classic radiator, called tubular in the United States. Water heating only requires a very accurate calculation of radiating surface and of pipe diameters.

The American way of computing radiating surface directly from the heat losses through walls, etc., may be sufficient to calculate the price of an installation, one inaccuracy compensating for another, but the method is inadequate when accurate work is necessary.

There are different ways of designing an installation. The same effect may be obtained with large radiators and narrow pipes as with small radiators and large pipes. Large and small are relative terms, the difference often being no more than a few per cent. This can never be attained with the American way of computing radiating surface.

In Holland, we have a bureau which makes heat loss calculations only. Every heating contractor makes his plan as he thinks best.

The basis of all calculations in water heating is the temperature difference between flow and return water. The larger this difference, the larger should be the radiating surface and the motive force for the water and the narrower the pipes.

PRINCIPLES INVOLVED IN WATER HEATING

Though I will not give too much theory, it is necessary to discuss to some extent the principles involved to understand the relation between these data as a basis of all calculations in warm water practice.

That the radiating surface increases with the temperature difference of the water is easy to understand. The heat transmission is the product of the difference between mean radiator temperature and room temperature and a coefficient K. As the boiler temperature cannot be raised, a larger temperature difference involves a lower mean radiator temperature, i.e., a lower heat transmission per square foot.

The motive force of circulation is the difference in density of flow and return water. This increases with the difference; therefore, the pipes can be smaller. A second cause is not so well known. When the difference is 40° F. each pound of water passing through a radiator gives off 40 B.T.U. Thus for 40 B.T.U. to be given off, 1 lb. of water has to be passed through a radiator. The larger

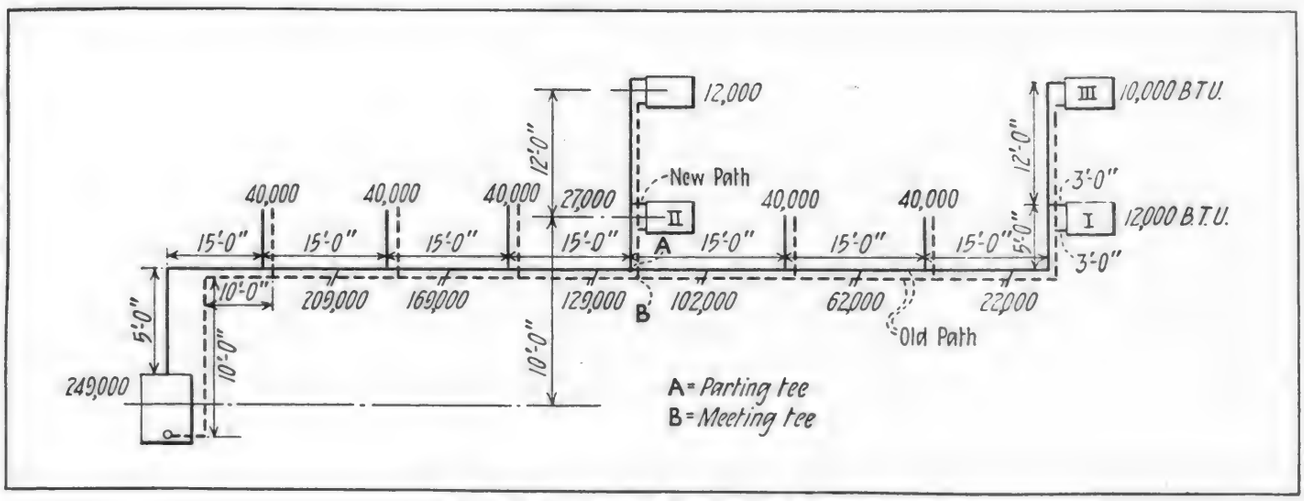


Fig. 1. Layout Used in Typical Problem

1	2	3	4	5	6	4_1	5_1	6_1
B.T.U. Per Hour	Length Ft. / 100	Allowance for "Accidental Resistances" Ft.	Diam. In.	Pressure-Drop Per 100 Ft. Lbs.	Total Pressure-Loss Lbs.	Diam. In.	Pressure-Drop Per 100 Ft. Lbs.	Total Pressure-Loss Lbs.
RAD. I								
249,000	0.2	0.2	~~4~~	~~1.0~~	~~0.40~~	$3\frac{1}{2}$	1.9	0.76
209,000	0.15	0.15	$3\frac{1}{2}$	1.33	0.40			
169,000	0.15	0.15	~~$3\frac{1}{2}$~~	~~1.0~~	~~0.30~~	3	1.96	0.59
129,000	0.15	0.15	~~3~~	~~1.2~~	~~0.36~~	$2\frac{3}{4}$	1.9	0.57
102,000	0.15	0.15	~~$2\frac{3}{4}$~~	~~1.18~~	~~0.35~~	$2\frac{1}{2}$	1.9	0.57
62,000	0.15	0.15	$2\frac{1}{2}$	1.32	0.40			
22,000	0.2	0.2	$1\frac{1}{2}$	1.08	0.47			
12,000	0.06	0.06	1	3.2	0.38			
22,000	0.17	0.17	$1\frac{1}{2}$	1.08	0.37			
62,000	0.15	0.15	$2\frac{1}{4}$	1.32	0.40			
102,000	0.15	0.15	~~3~~	~~1.18~~	~~0.35~~	$2\frac{1}{2}$	1.9	0.57
129,000	0.15	0.15	~~3~~	~~1.2~~	~~0.36~~	$2\frac{3}{4}$	1.9	0.57
169,000	0.15	0.15	~~$3\frac{1}{2}$~~	~~1.0~~	~~0.30~~	3	1.96	0.59
209,000	0.15	0.15	$3\frac{1}{2}$	1.33	0.40			
249,000	0.25	0.25	~~4~~	~~1.0~~	~~0.50~~	$3\frac{1}{2}$	1.9	0.95
	2.38	2.38			5.74			7.99
Available pressure-head 8.2 lbs.								
Total pressure-drop 7.99 lbs.								
Balance 0.21								
RAD.II Available pressure-head 3.77 lbs. mean $\frac{\text{p.d.}}{100\text{ ft.}} = \frac{3.37}{0.52} = 6.6$ lbs.								
27,000	0.05	0.15	$1\frac{1}{4}$	3.2	0.64	~~1~~	~~14.0~~	~~8.80~~
15,000	0.06	0.18	1	4.8	1.15			
27,000	0.02	0.06	~~$1\frac{1}{4}$~~	~~3.2~~	~~0.86~~	1	14.0	1.12
	0.13	0.39			2.05			2.91
	0.52						Balance . . .	0.46 lbs.
RAD.III								
10,000	0.3	0.6	$\frac{3}{4}$	7.0	6.3	$\frac{1}{8}$	40.0	36.0
	0.9						Balance . . .	4.13 lbs.

Table 1. Calculations for Determining Pipe Sizes for Typical Installation

the difference, the smaller the quantity of water to be moved and the smaller can be the pipes.

The method of calculating the pipe diameters on the basis of the temperature difference was devised by Professor Rietschel and has simplified the calculation of hot water systems very much. The second principle of even greater importance is: The sum of all resistance ought to be, and cannot but be, equal to the available pressure-head.

This rule applies as well to the calculations of water heating and steam heating as to a chimney stack and an oil-pipe line. It is of no account if the resistances are equally divided. Some may be very large, others very small, but if the sum is right, the installation will be right.

Each radiator is connected to the boiler by a part of the pipe line. This combination is called a circuit; it consists of a boiler, flow main, radiator, return main and boiler.

Each circuit has its own pressure-head. Through every part of it a definite amount of water has to flow.

When all parts of the circuit have the correct diameters

(1) The right amount of water will flow through it.

(2) The right amount of pressure-head will be used.

(3) The right temperature drop of the water will be noted.

It is of no account if the pressure-drop per foot is the same for different parts of the circuit. If the sum of all the losses is equal to the total amount available, the effect will be the same as when a constant pressure-drop should have been obtained.

A constant pressure-drop is not the same as a constant velocity. Adding the square of the diameters of the risers is not the right manner in which to obtain the diameter of the main.

Calculations ought to be made accurately, if at all, and the whole system should be calculated with the same care. The old way of calculating only the longest circuit and "pouring the rest out of your sleeve," i.e., estimating the other diameters, does not meet the demands of accuracy and competition. Every extra hour spent on making the design accurate means a day less of regulating by the fitter. With all the pipe dimensions just what they ought to be, all the costly automatic devices for regulating the room temperature can be dispensed with.

I know very well the difficulty of calculating with the English or American dimensions. The Euro-

pean decimal system is much simpler. Nevertheless, it is possible to work with good tables once they are made. I will give one such table with a simple method of using it.

PRINCIPAL CAUSES OF RESISTANCE TO FLOW OF STEAM OR WATER

Resistance of a circuit to the flow of water or steam has two causes; first, the friction of the heating medium against the pipe surface; second, the accelerations and turbulence of the heating medium in valves, bends, tees, etc., which also cause loss of pressure-head.

The first losses are proportional to the length of the pipe. The second losses must be figured. Most "accidental resistances," as they are called, are to be found near the boiler and the radiator, where are most of the bends, tees, valves, etc. For very accurate calculations, these are totaled and the true pressure-loss, relative to the velocity of the water or steam, is calculated.

In many cases it is enough to add a certain percentage to the pipe length. If a complete circuit is calculated, 100% of the pipe length is to be added. To the length of a riser with radiator, add 200%. For the runouts from a riser to a radiator 300% has to be added to the measured length.

The pressure-head available to move the water through the piping depends upon two factors—the difference of specific weight of the hotter and cooler water and the height of the center of the radiator above the center of the boiler.

In steam heating systems the pressure needs only to be sufficient to bring the steam to the radiator. With a hot water system, the available pressure-head must cause the water to flow back to the boiler again.

When the flow temperature of the water is 36° F. higher than the return temperature, each foot of height of the center of the radiator above the center of the boiler gives a pressure of 0.82 lbs. per square foot.

Only when all of the calculated pressure-head is used will the difference of 36° F. between flow and return water occur. When the pipes do not give the exact pressure-loss, other velocities will appear which involve another rate of cooling and another pressure-head. The pressure-head cannot but be equal to the pressure-loss. Getting too little pressure-head or too much is only possible on paper. What really happens is getting too low or too high temperature difference. An example will show the way to get moderately-accurate values in a simple manner.

FIGURING A TYPICAL INSTALLATION

In the accompanying sketch (Fig. 1) the height of radiator No. 1 above the boiler (measured from

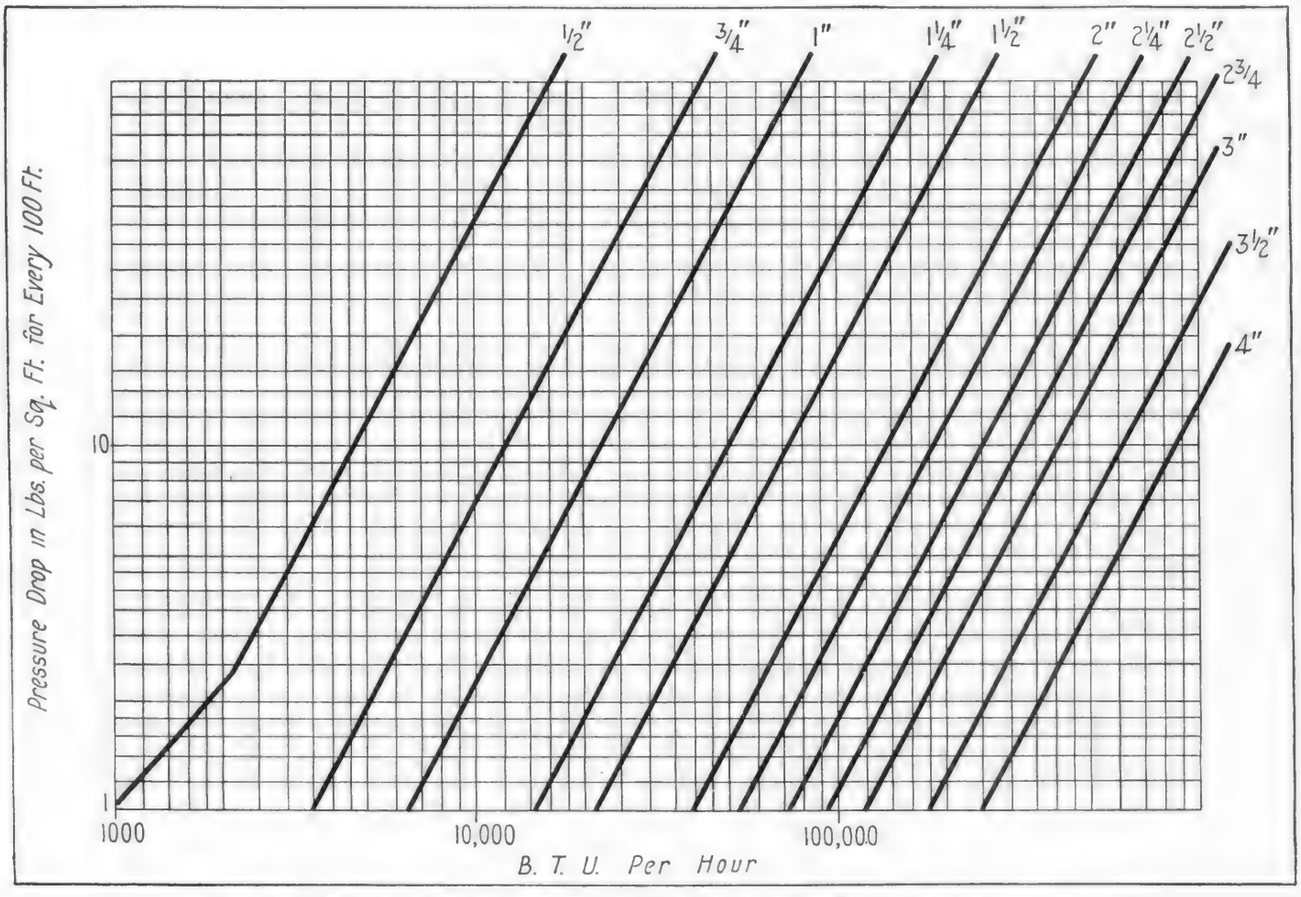


Fig. 2. Chart for Figuring Pipe Diameters Based on the Brabbee Friction Tables

center to center) is 10 ft.; the available pressure-head 10 x 0.82 = 82 lbs. per square foot.

To simplify the calculation, we use the form shown in Table I. In the first column is the B.T.U. per hour. Beginning at the boiler, all the different parts of the circuit are put down, passing through the radiator and coming back to the boiler again. This done, the length of each part is measured and divided by 100. In Col. 3, the extra allowance is noted for accidental resistances. As we are calculating a complete circuit, 100% is added to every length.

Now, the sum of Cols. 2 and 3 is divided by the available head. The quotient is the mean pressure-drop per 100 ft.

$$\frac{8.2}{4.76} = 1.73 \text{ lbs. per square foot per 100 ft.}$$

The clearest way to present a table is in the graphical form. It is to the great credit of the German professor, Doctor Brabbée, now residing in America, to have given a formula for pressure-drop in pipes that is very easy to put down in graphical form. On logarithmic paper all lines become straight, and, therefore, are very easy to draw.

Professor Brabbée, who was the successor of Professor Rietschel at Berlin University, has revised the standard book, the "Leitfaden," for the greater part. He also gives new friction tables. His book has been translated into English and I think every American heating engineer should possess it.

The graphical table, Fig. 2, used in this article is based on the values Professor Brabbée has given. It is only one of the many tables to be found in the "Leitfaden." On the horizontal scale is the B.T.U. passing per hour through the pipes at a temperature difference of 36° F. On the vertical scale the pressure-drop per square foot for every 100 ft. is given. For every pipe diameter an oblique line is drawn.

HOW TO USE THE CURVES

The use of the curves is very simple. Moving in a vertical direction from 10,000 B.T.U. to the line for the ¾-in. pipe, we intersect this line at the horizontal through 7 lbs. per square foot of pressure-drop for every 100 ft. of pipe length.

This, however, is not the question. We want to find the diameter in a given case.

A riser has to produce 100,000 B.T.U. at a pressure-drop of 10 lbs. When we follow the horizontal line through 10 lbs. until we strike the vertical through 100,000 B.T.U., we are halfway between 1½-in. and 2-in. The pipe will have to be 2-in. but the pressure drop is only 5.6 lbs.

How to compensate for this difference between available and true pressure-loss will be shown later.

In our case the available pressure-drop is 1.73 lbs. We trace a horizontal line through 1.73 lbs. and find the diameters noted in Col. 4 of the chart, with but one exception. The diameter of the run-out to the radiator ought to be 1¼ in., but I don't think such large radiator valves are very sightly and, therefore, we make it 1 in.

This may seem a strange procedure, but in the end, as we shall see, everything will turn out right.

THE POINT OF DIVERGENCE BETWEEN EUROPEAN AND AMERICAN PRACTICE

Now comes the great difference between the European and the American practice of pipe design, and with it the answer to the question put in the title. In Col. 5 we put down the true pressure-drop. Following the vertical line through 209,000 B.T.U. till we strike the oblique for a 3½-in. pipe, we find a pressure-drop of 1.33 lbs.

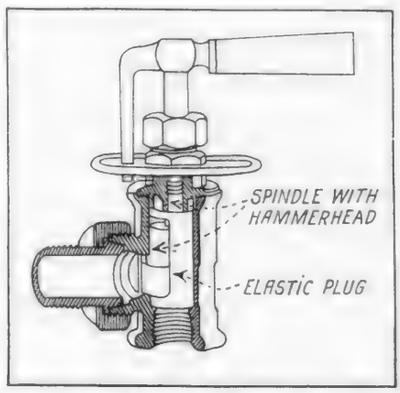


Fig. 3. Water Radiator Valve for "Regulating Off" Small Differences in Pressure-Loss

The true pressure-loss in this part of the circuit is (0.15 + 0.15) 1.33 = 0.4 lbs. per square foot. For all parts of the circuit the pressure-loss is calculated in this way.

The sum of all true pressure-losses in the complete circuit only amounts to 5.74 lbs. to an available pressure-lead of 8.2 lbs. This means that not only were we justified in making the radiator connection 1 in., but that we must reduce other diameters until the available, i.e., the necessary pressure-loss of 8.2 lbs., is obtained.

In Cols. 4, 5 and 6 these changes are made and at a pressure-loss of 7.99 lbs. we stop. This small difference is of no account. The rest is "regulated off," as we call it, in the last radiator valve. These are provided with an internal-regulating device, for the use of the fitter only.

Fig. 3 shows such a radiator valve. The first thing to be noticed is, that it is not a valve but a cock. The disc is moved by a spindle with a hammer-head. The handle can only be turned 90°. When taken off and put upside down, the handle can be used for regulating. On the spindle a slow-speeded thread is cut and when turned to the right it sinks the hammer-head deeper in the hole of the disc, partially closing it. By this means the whole of the 8.22 lbs. is used in the circuit.

What I have said about the calculation is only the first part of the secret. The second and not the least is: Calculate every circuit of every radia-

(*Continued on Page* 81)

The Status of District Steam Heating

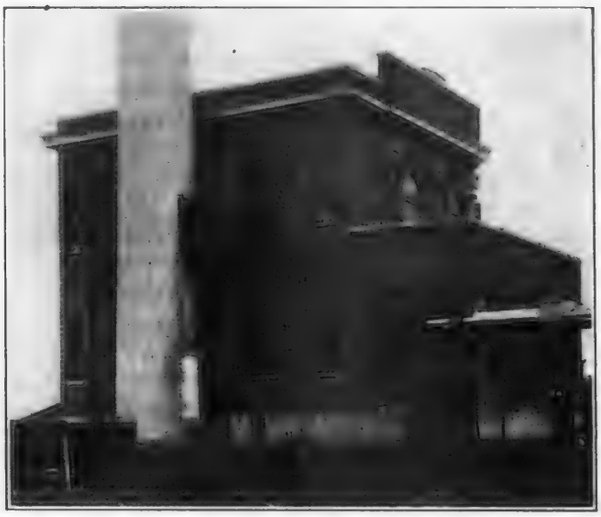


Fig. 1. Boiler House, Showing Heating Lines Leaving the Building

Part II—New Lincoln Park Plant at Rochester, N. Y.

A NEW district heating plant has been built and placed in operation by the Rochester Gas and Electric Corp., in Rochester, N. Y. This plant, which is shown in Fig. 1, is located on the outer edge of the West Side industrial district, the site having been selected with the probable future growth of the industrial section in mind. It will furnish low-pressure steam at 15 lbs. gauge and high-pressure steam at 125 lbs. gauge to the nearby factories.

The plant is on the right of way of the New York Central Railroad and is located immediately on the north side of the tracks. For factories located on the south side it is necessary to carry the mains across the railroad on a steel bridge with a 124-ft. span. With the exception of the bridge all the distribution system of piping is carried underground.

At the present time steam to the low-pressure lines is supplied through reducing valves. It is the plan, however, to install at some future time a 3000 k.w. turbo-generator from which the 125-lb. steam will be extracted during one of the earlier stages and the exhaust from which will be sent through a reheater and then into the low-pressure lines.

The electric current thus generated will be purely a by-product and will be returned into the mains of the public service company operating the plant.

Fig. 2. Bridge Carrying District Heating Lines Over New York Central Tracks

FUEL HANDLING

The plant is a pulverized-coal installation which uses either slack or lump bituminous coal for fuel. Coal may be delivered direct to the plant from the tracks of the New York Central and dumped through a track hopper onto an inclined belt conveyor. The coal is carried 60 ft. and spilled over a magnetic pulley which separates the tramp iron from the fuel and then it falls into the storage bins.

From the bins the coal is delivered to the crusher which is arranged with a by-pass for use when crushed coal is received. The coal is then carried up—by a vertical belt conveyor—to a horizontal belt conveyor above, upon which is installed a movable trip. The horizontal conveyor runs through monitor above the sheet-steel coal-bunker which is suspended near the roof and in front of the furnaces. The bunker has a storage capacity of 720 tons.

From the bunker the coal passes down to the coal-pulverizing mills located in front of each furnace, the large mill having a capacity of 8,500 lbs. of coal per hour and the small mill, 2600 lbs. per hour.

Space has been provided for the installation of a second large-size pulverizer mill in front of each furnace. With this third mill in position provision will have been made for an hourly consumption of 10 tons per furnace.

WATER SUPPLY

Water for the plant is obtained from two sources —the municipal supply (which comes from Hem-

lock Lake, thirty miles distant) and from the mains of the Rochester and Lake Ontario Water Company, which secures its supply from Lake Ontario, seven miles to the north.

Contrary to usual practice, condensation from customers is returned to the plant by pumps and is discharged into a deaerator tank which is provided with a ball float so that make-up water from the outside supply is admitted whenever the water level drops in the tank.

It is expected to carry a temperature of about 115° F. by means of which the water will be robbed of a large part of its air content and the danger of pipe corrosion will materially be reduced.

From the tank the water flows by gravity to the boiler-feed pumps, one of which is turbine-driven, with a capacity of 500 g.p.m., and the other of which is motor-driven, with a capacity of 300 g.p.m. A constant difference of 50 lbs. is maintained between the steam pressure and the boiler-feed pressure by means of a differential-pressure regulator.

BOILERS

The boilers are built to carry 384 lbs. pressure and are equipped with superheaters which will give 98° F. superheat. At the present only two furnaces and boilers have been installed, each of the present boilers having 9580 sq. ft. of heating surface and 1639 sq. ft. of integral economizer.

Each boiler is equipped with a total of five safety valves whose combined capacity is estimated at 215,000 lbs. of steam per hour, whereas the possible steam accumulation will not be over 180,000 lbs. during a similar period.

EQUIPMENT

Some of the various items of equipment installed in this plant are, briefly:

Two Bigelow Company boilers of vertical water-tube type, with Diamond Power Specialty Company soot blowers and Power Specialty Company superheaters.

Pulverizing coal system, Combustion Engineering Corporation.

Coal handling equipment by Erskine-Healy, Incorporated, and Jeffrey Manufacturing Company.

Coal crusher by Jeffrey Manufacturing Company.

Pumps, Pennsylvania Pump Company.

Low-pressure gate valves, Lunkenheimer Company.

The plant was designed by the staff of the Rochester Gas and Electric Corporation under the direction of Roger D. DeWolf, assistant superintendent of Electric Department; I. E. Powell, superintendent, Steam Generation and Steam Distribution Department; S. Firestone, consulting engineer; K. B. Castle, Jr., assistant engineer, and R. H. McCumber, superintendent, Lincoln Park plant.

Fig. 3. Coal Pulverizer Mills in Front of Boilers

"The Next Size Larger"

(*Continued from Page 79*)

tor in the same way. This may mean a large amount of work to be done, but when undertaken in the right way, the calculations can be shortened very much.

Every circuit has parts in common with the first circuit. For this common portion the diameters have already been calculated and the amount of pressure-head used in it is fixed. This amount can be found in the calculation of the first circuit.

What is left over when we subtract the pressure-loss in the common part of the available pressure-head is the amount of the pressure-head available for the other portion of the new circuit.

The circuit through Radiator II has the same pressure-head available as the first one—8.2 lbs. In the part common with the first circuit 4.83 lbs. are used. There are left 3.37 lbs. to be used in the other portion.

There is still another way to find the pressure-head available for the non-common part. We call the places where both the non-common parts of the two circuits part and meet, the parting and the meeting tee. The non-common part of the first circuit is called the old path; the name of the new circuit, the new path.

The second rule now can be stated: "The pressure-head now available for the new path is equal to the pressure-head used in the old path, plus (or minus) the pressure-head the new circuit has more (or less) than the old one."

In the old path are used: 3.16 lbs. plus the 0.21 lbs. that were left over and which are to be regulated off in the valve. The sum, 3.37 lbs. is equal to the amount found in the first way. Both radiators have the same height above the boiler, so there is no difference in pressure-head to be added or subtracted.

The calculation of the pipe diameters proceeds in the usual way. As the length of the piping is very small, and as a large amount of accidental resistance is to be found near the radiator, we add 300% to the length of the piping.

The first calculation gives a pressure-loss of 2.05

lbs. When we change both parts of the riser from 1¼ to 1 in., the pressure-loss becomes 5.07 lbs., which is far too much. Changing only the flow riser, we find 4.21 lbs., which is yet too much. Therefore, we change the return riser only and stop at a pressure-loss of 2.91 lbs., with a remainder of 0.46 lbs. to be regulated off.

Never erase the alterations, only strike them out. It makes cleaner work and one always is able to follow the whole of the calculation and convince another of its correctness.

We note here the odd fact of two pipes meant to convey the same amount of water having different diameters. This would not have been the case if pipes of a diameter between 1¼ in. and 1 in. were to be had. The main point is to use all of the available pressure-head.

Radiator III now has to be calculated. In the old path, the runout to Radiator I, 0.38 lbs. is used. and the remainder of 0.21 lbs. = 0.59 lbs. The height of Radiator III above I is 12 ft. Thus 12 x 0.82 = 9.84 lbs. of pressure-head are to be added.

For "accidental resistances" we add 200% to the length. The diameter can only be ¾ in., although, on an available pressure-head of 10.43 lbs., 4.13 lbs. are left over. A ½-in. pipe would give a pressure-loss of 36 lbs. Neither the flow nor the return riser can be made ½ in.

In this way every circuit of a water heating plant has to be calculated. Although, in several cases, small amounts of pressure-head are to be regulated off, these are of very little account.

A short time ago a hot-water system with more than 400 radiators, calculated in the way here described, was completed. Though no pumps are used to circulate the water, and the largest circuit is over 600 ft., practically all the radiators got warm at the same moment. The temperature at the boilers was no higher than 80° F. No regulating of the radiator valves was necessary, but I spent 10 days in calculating the pipe sizes.

Heating and Ventilation Specifications

(*Continued from Page 75*)

If no deposit is desired the above may be changed to read as follows:

BOND:

Before signing the contract, the successful bidder will be required to file a bond in the form attached to the contract to the amount of..... percent of the amount of the contract price, for the faithful performance of the contract. Such bond shall be executed by the Contractor and a satisfactory Corporate Surety Company, authorized to do business in the State of.....

(Note—This is used when no deposit is required.)

No. 1 specification states in regard to a bond that

The Owners reserve the right to require the contractors to furnish an indemnity bond, covering the faithful performance of the contract and the payment of all obligations arising thereunder. The said bond shall be made out in such form and with such sureties as the Owners may prescribe, the terms of which shall be agreed upon and stated in the contract. The premium on the bond, if required, will be paid for by the Owner.

No. 2 refers to the general conditions of the general contract but No. 3 says—

The successful bidder shall sign a contract for the work bid upon, and execute the required bond for same within ten days from the date of notification of the acceptance of his bid. The contract and bond will be made in accordance with the form prepared by the Board of Education, a copy of which is hereto attached. The general conditions and the specifications, and the drawings to which reference is made, shall be deemed a part of the contract for any and all branches of the work, and shall be referred to in interpreting the contract.

The successful bidder will be required to furnish bond to complete the work included in his contract on or before.....192...giving as surety an approved Surety Company Bond, with liquidated damages in the sum of $50.00 per diem for delay beyond the time of completion of all or any part of the work. For contracts less than $10,000.00 the bond shall be equal to the contract price; for contracts of $10,000.00 or more, but less than $50,000.00, the bond shall be equal to $10,000.00 plus 50% of the amount by which the contract price exceeds $10,000.00 and for contracts of $50,000.00 or more the bond shall be $30,000.00 plus 25% of the amount by which the contract exceeds $50,000.00.

In lieu of giving the bond provided for in this rule the contractor may deposit a like amount in cash with the Secretary and Treasurer of the Board.

No. 4 states that

Bond shall be furnished by an approved surety company in the amount of the contract price, and shall be furnished when the contract is signed. It shall cover all the provisions of the guarantee clause, as well as the standard provisions of the contract. It shall cover the entire time of execution of the contract, and shall terminate only on the completion and acceptance of the contract as a whole.

In No. 5 apparently the matter of bond is taken care of in the standard proposal forms furnished.

In No. 6 the bond is covered by the following:

Bonds, both Statutory and Performance, will be required by the Owner and shall be furnished by the Contractor at his own expense. The tender of a proposal on the work herein described shall be evidence of the Contractor's willingness to work under bonds.

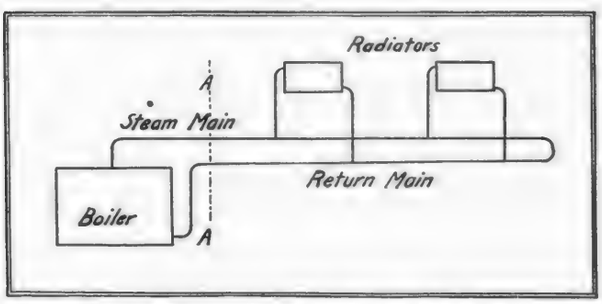
(*To be continued*)

Should a Boiler Be Rated on Basis of Heat Delivered at Outlet?

REFERRING to the article on boiler rating in THE HEATING AND VENTILATING MAGAZINE for January, a correspondent makes the following comment:

"Referring to the sketch showing a boiler installation in which all condensation returns to the boiler, all heat given up by radiators and piping to the right of the reference line A-A constitutes the total equivalent radiation or total load on the boiler. It is not correct that the total equivalent radiation is equal to the square feet of radiation in the radiators plus 25% for piping loss, but rather determine the actual heat loss from the specifications of pipe sizes and covering and reduce it to equivalent radiation and add it to the installed radiation. A boiler that will provide sufficient steam to supply 240 B.T.U. for each square foot of total equivalent radiation would be given that rating.

"For example, if the total equivalent radiation installed to the right of line A-A were 2000 sq. ft., the total boiler load in B.T.U., based on the American Society of Heating and Ventilating Engineers' Guide factor of 240 B.T.U. per sq. ft. per hr., would be 2000 x 240, or 480,000 B.T.U. per hr. A boiler that would supply 480,000 B. T. U. per hr. would be rated at 2000 sq. ft.



Should a Boiler Be Rated on the Basis of B.T.U. Absorbed Beyond Line A-A?

"If sufficient radiation were installed in the building so that on cold days the room temperature would drop below 70° F., then the radiators, if supplied with sufficient steam, would give off more than 240 B.T.U. per hr. and the boiler would be too small. But that would not be the fault of the boiler, since when the room temperature was lowered because of insufficient radiation, then the equivalent radiation would be more than 480,000 B.T.U. per hr.

"The writer believes that it is wrong to rate boilers on the heat delivered at the boiler outlet alone, and feels that it is only correct to base the rating on the total heat absorbed by the water while passing through the boiler; that is, the total heat at boiler outlet minus the heat in the returns as it enters the boiler. This difference will most likely be somewhat greater than the latent heat of vaporization at boiler pressure because (1) the steam may be superheated at boiler outlet, and (2) the returns at boiler may be below saturation temperature.

"Ratings of this kind only can be determined by careful tests. If the manufacturer will furnish data from reliable tests giving rating in B.T.U. absorbed in boiler and efficiencies at several ratings with the conditions and kind of fuel used, then the purchaser would be able to select the proper size of boiler. The writer believes that it is the work of the manufacturer's engineers to handle this problem in determining ratings and for the heating engineer in determining the heat requirement or total equivalent radiation."

Furnace and Fuel-Oil Specifications

UNIFORM specifications for the guidance of oil and burner manufacturers and dealers have been announced by the American Oil Burner Association. These specifications are the result of research, tests, correspondence, and conferences carried on over two years. The American Petroleum Institute and the American Society for Testing Materials co-operated in the work, and the fruits of this labor have received the practically unanimous approval of the members of the American Oil Burner Association.

In announcing these specifications, Harry F. Tapp, technologist of the A.O.B.A., points out that one of the greatest variables in oil-burner operation has been non-uniformity of oil. This probably has been more responsible for lack of satisfactory operation than any other one cause. Burner manufacturers found it difficult to explain just what oil they wanted, and oil refiners were in doubt as to the needs of the manufacturer of burners. The oils used have been generally satisfactory and trouble has been due, in the main, to occasional variations.

The first step in solving this problem was the appointment by the American Oil Burner Association of a committee which made a survey with the co-operation of the American Petroleum Institute. Committee D2 of the American Society for Testing Materials also was asked to make a tentative specification form. Data on nearly one hundred oils were examined and tabulated, including almost every type of oil on the market, and representing almost every locality. Tentative results were submitted to the oil-burner and fuel manufacturers and to the Underwriters' Laboratories, and the criticisms received proved useful in determining the final specifications.

The specifications apply to six types of oil, including light, medium and heavy grades of furnace-oil used in domestic heating, and light, medium and heavy grades of fuel-oil for industrial use. The requirements cover flash point, distillation range, viscosity, and amount of water and sediment.

This classification will create an entirely new situation in the oil-burner industry, and the old rating on the gravity basis passes entirely out of the picture.

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AFTER thoroughly exploiting the policy of selecting oil-burner dealers for their high-pressure sales ability, the oil-burner manufacturers who have followed this policy are at last waking up to the fact that they have ignored what is, by all odds, the most vital factor of all, namely, mechanical ability. As one manufacturer has tersely phrased it, we have been following the order of (1) salesmanship, (2) financial responsibility, (3) reputation and (4) mechanical ability, when we should have followed the order of (1) mechanical ability, (2) reputation, (3) financial responsibility and (4) salesmanship. According to this manufacturer, it is due to the same mistaken order in which the dealers' qualifications have been listed that we find, on one hand, so many house-owners unsold on the domestic oil burner and, on the other hand, so much inertia to overcome on the part of the heating contractor.

Of course, mechanical ability can refer only to the heating man. He holds the key to the situation and has from the beginning. Too often has he stood on the side lines, partly from necessity but mostly from choice, and watched the slick oil-burner salesmen put over sales and proceed with installations which, in the nature of things, could not give satisfaction, due as much to defects in the heating system itself as to incorrect installation of the burner.

But, after all, the solution is not as simple as all that. Until recently the heating industry has not been organized to sell and the heating contractor is seldom a salesman. Not only that, but his training and inclination make it hard for him to understand the oil burner. He is not a machinist and never was, —and the oil burner is a machine. In too many cases his attitude has been one of unreasoning bias when, if the truth were known, he was not sure enough of his ground to discuss the subject intelligently. Within a month an important group of heating men, gathered to hear a discussion of domestic oil burning, permitted the opportunity to slip by to learn just what was the situation in this important field.

Here is an industry—domestic oil burning—which has passed through the pangs of childbirth and through the first teething period anyway, and which now gives every indication of developing into a healthy youngster that is going to make a noise in the world. What are heating men going to do about it? Are they going to sit tight with the idea of seeing which way the cat jumps and then following suit, or are they going to get busy and take their rightful place in this field up near the head of the procession? While they are making up their minds the oil-burner people are marshalling their resources for the big push. It would be a calamity if these manufacturers should find themselves forced to develop their own mechanical talent.

IN the appointment of a representative of the Heating and Piping Contractors National Association as chairman of a Committee on Co-operative Research, the interested organizations have taken a step which will be looked upon as an earnest of their determination to secure some tangible results for their efforts. So far in the co-operative movement between the heating engineers and the heating contractors, the standards which have won mutual acceptance are those of the A.S.H. & V.E. This, of course, was quite natural in view of the fact that the A.S.H. & V.E. is an engineering body and the H. & P.C.N.A., a commercial organization.

It so happens, however, that the H. & P.C.N.A. has done some original research work of its own, which has won a wide recognition in the industry. We refer to its Engineering Standards and, more particularly, to its Standard Radiation Estimating Tables. The American Gas Association, which also is represented in the present movement, is the originator of the Degree-Day as a measure of the heating load. It would be a splendid thing if the committee and the industries they represent could now agree on these two "standards." Not only would it be a deserved recognition of their merits but it would aid materially in establishing uniformity in heating practice.

How Would You Do It?

THIS question considers the amount of steam stored in a boiler-room header and available for use in case of a sudden demand. Many engineers of the old school, especially those brought up with a large experience in power-plant work, are advocates of the large-sized boiler header. With heating systems the change in load is much more gradual than in power plants, where sudden fluctuation may occur in short periods of time. Therefore it may be stated that, as a general proposition, steam-header capacity in heating plants is unnecessary.

The problem involves the determination of the difference in capacity between an 8-in. header and a 12-in. header 30 ft. long with steam at 100 lbs. gauge pressure. But first it is necessary arbitrarily to assume some lower pressure to which the steam may drop in order that it can have any available capacity at all. In other words, if the steam is maintained in the header at 100 lbs. gauge, it must be supplied by the boiler at the same rate that it is drawn out, and under these conditions there is no available capacity in the header, and it simply acts as a conveyor. If steam is supplied to the header faster than it is drawn out, the pressure in the header will rise and the header will have a receiver capacity. On the other hand, if steam is drawn out of the header faster than it is supplied, the pressure in the header will fall and the excess amount of steam delivered over that supplied can be considered the storage capacity of the header—and this is the characteristic upon which the problem bears.

It will be assumed that it is permissible for the steam pressure, in either size of header, to be drawn down from 100 lbs. gauge to 70 lbs. gauge—a drop of 30 lbs. Then, to compute the amount of steam available under this condition, from the two sizes of header, it will be necessary to calculate the quantity of steam in each header at 100 lbs. and at 70 lbs. The difference between these two amounts will be the available delivery capacity.

The area of an 8-in. pipe is 50.04 sq. in., which, divided by 144 is 0.347 sq. ft. and the volume of 30 ft. of header will be:

$$0.347 \text{ sq. ft.} \times 30 \text{ ft.} = 10.41 \text{ cu. ft.}$$

At 100 lbs. gauge pressure, the volume occupied by 1 lb. of steam is 3.88 cu. ft. so that in every cubic foot of header, there will be

$$\frac{1}{3.88} = 0.257 \text{ lb.},$$

and the entire 30 ft. length of 8-in. header will contain

$$0.257 \times 10.41 = 2.67 \text{ lbs.}$$

Question No. 8

In a heating installation involving 50,000 sq. ft. of equivalent direct radiation the steam will be supplied from a high-pressure, 100-lb. boiler. The heating engineer recommends an 8-in. header, 30 ft. long, in the boiler room, from which steam will be taken through reducing valves to supply the heating system. The architect thinks a 12-in. header of the same length advisable, due to the additional storage capacity of high-pressure steam which would be held in reserve in the header to take care of any sudden demands. Is there any advantage to be gained by using the 12-in. header, and what additional heat storage capacity would be gained? Assuming a drop from 100 lbs. gauge down to 70 lbs. gauge in the header, how long would the extra steam capacity, obtained by using a 12-in. instead of 8-in. header, supply the radiation in the building?

When the pressure drops to 70 lbs. gauge, the cubic feet per lb. is

$$\frac{1}{5.19} = 0.193 \text{ lbs. per cu. ft.}$$

Then the 8-in. header under 70 lbs. pressure will contain

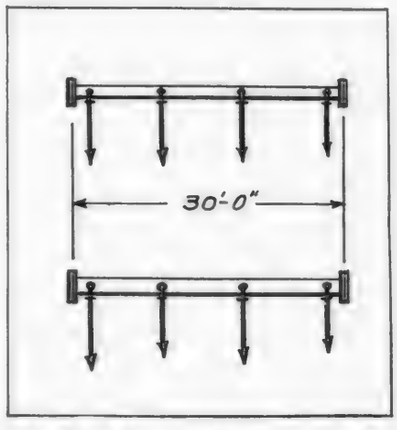
$$0.193 \times 10.41 = 2.01 \text{ lbs.}$$

From this it can be seen that the quantity of steam delivered from the 8-in. header with a drop from 100 lbs. down to 70 lbs. will be the difference between 2.67 lbs. and 2.01 lbs., or 0.66 lbs., which is a very small amount.

Considering in the same way the 12-in. header, it will be found that its area is 113.10 sq. in. or 0.785 sq. ft.

The cubic contents will be

$$0.785 \times 30 = 23.55 \text{ cu. ft.}$$



Problem Presented in Question 8

As, at 100 lbs. gauge pressure, there is 0.257 lbs. of steam per cubic foot, in 23.55 cu. ft. there will be

$$0.257 \times 23.55 = 6.05 \text{ lbs.}$$

and as, at 70 lbs. gauge, each cubic foot contains 0.193 lbs., in 23.55 cu. ft., there will be

$$0.193 \times 23.55 = 4.54 \text{ lbs.}$$

From this, it will be seen that the delivery capacity of the 12-in. header, when the pressure drops from 100 lbs. to 70 lbs., will be the difference between these two amounts of 6.05—4.54, which is 1.51 lbs. of steam.

Then, under the same condition of pressure drop, the 8-in. main will deliver 0.66 lbs. of steam while the 12-in. main will deliver 1.51 lbs. and the excess which the 12-in. main will deliver over the 8-in. main is 0.85 lbs. of steam.

If it is assumed that the peak load covers a period of 15 min., and if each square foot of radiation condenses 1/3 lb. per hr. of steam then the condensation used in each square foot of radiation during a 15-min. period will be

$$1/3 \times 15/16 = \tfrac{1}{2} \text{ lb.}$$

Consequently 1 lb. of steam would be able to supply 12 sq. ft. of radiation for a 15-min. period and the 0.85 lbs. of steam, which is the excess capacity gained by using the 12-in. header, would be able to supply

$$12 \times 0.85 = 10.2 \text{ sq. ft. of radiation.}$$

This amount is so small as to hardly equal a single radiator and on an installation involving 50,000 sq. ft. would be but 0.02% of the whole. From this, it is plainly evident that the increase of the header from 8-in. to 12-in. size involves an expense which is entirely unwarranted, besides serving no useful purpose.

PROBLEM FOR NEXT MONTH

Question No. 9

A manufacturing plant has a building 200 ft. away from its boiler plant and intends to run a 4-in. low-pressure overhead steam main, carrying steam at 2 lbs. gauge pressure, from the boiler house to the building. What will be the net saving, if any, per annum, by insulating this main with insulation having 70% efficiency, if the covering, weatherproofing, etc., costs $3 per foot and the boiler plant is using coal at $6 per ton? The coal has 12,000 B.T.U. per pound and the overall boiler efficiency is taken as 72%. Assume this steam line is hot 24 hrs. per day for 365 days in the year, and that 6% interest must be paid on money used. Loss from bare iron pipe can be taken as 3 B.T.U. per square foot, per degree F. of temperature difference.

The Heating and Ventilating Magazine's B.T.U. Club

EVERY reader of THE HEATING AND VENTILATING MAGAZINE, *whether a subscriber or not, is a member of this club. There are no initiation fees or dues. There is not even a constitution. The club will function as a forum or round table for the informal discussion by our readers, particularly the younger men, in the industry, of topics in which they are interested, provided only that such topics pertain directly or indirectly to heating and ventilation.*

La Maison Nouvelle

MR. CHAIRMAN:

I think your plan for the establishment of the B. T. U. Club as a place where we youngsters can voice our opinions and ask crazy questions without fear of being called down is a good one; I like the idea immensely.

So many of us young fellows have bright and original ideas that are difficult to put across in our own organizations because those higher up have, as a rule, a contemptuous feeling for the men below them, consequently our ideas don't get very far. Here is the nucleus of an idea, and I will appreciate it if you will put the matter up to the members of the B. T. U. Club for suggestions and comments.

In an important New York department store is a show-window designated "La Maison Nouvelle." This it seems is a suggestion for "a home for two," that is said to have been inspired by the exposition at Stuttgart. What is bothering me is how a home of this kind would be heated, should we have the misfortune to adopt this "new day art" in these United States. It will be interesting to see what kind of concealed radiation would harmonize with some of the topsy-turvy elements of this so-called "new day art."

If the Dwellers in La Maison Nouvelle After Warming Their Hands at the Nebulous Fountain on the Terrace Do Not Stumble Over the Fish on the Doorstep They Pass Through the Entrance Door (Sidewise)

This sort of thing is so new to the eyes of inhabitants of my middle-west state that I am not a little puzzled to know just what it all means. Here is a picture looking from the terrace into the living-room, or I should more properly say studio. The stand in the immediate foreground seems to be a round-top table upside down, and the stand in the studio in front of the exotic chair also appears to have its top on the floor and a board laid across its legs. I am wondering if the pie-shaped and trian-

The "Elusive" B.T.U. (Visible on the Wall of the Inner Room) Heat This Art Nouveau Home in Which the Dwellers Also Derive Questionable Warmth From the Illuminated Fountain at the Right

gular things on the wall are elusive B.T.U.

Perhaps they are the sole source of heat in this studio, the heat being caused by the friction between the pipe-shaped (male) B.T.U. and the triangular (female) B.T.U., in molecular movement.

I would be glad to have members of the B. T. U. Club submit suggestions for radiator designs to harmonize (?) with this new art, in all its agony.

Very truly yours,

RADIANT HEAT.

Ballyhooing the Unsophisticated

MR. CHAIRMAN:

For years, it has been generally accepted that a square foot contains 144 sq. in. At least, that was the general impression people had when buying radiation. The square foot is the unit of price according to which sections of cast-iron radiators were and are sold. To be sure, heat output is measured in British thermal units. Radiators and radiator sections emit quantities of B.T.U. varying with height, width, number of columns, design, thickness of casting and with the number of sections contained in a radiator. All of these quantities could be and were determined for radiators in general use. In fact, the A.S.H. & V.E. has published in its *Guide* a table showing the B.T.U. emitted by column radiation from one to six columns wide and from one to 20 sections per radiator.

This table clearly demonstrated that while the B.T.U. emitted per square foot of radiation varied with the variable factors—small, low, narrow radiators were considerably more efficient than high, wide radiators. This made it possible to heat rooms with a minimum of radiation by placing low, narrow radiators under the windows and this has been the practice of the best heating engineers.

For the convenience of engineers and in order to give a working unit, it was generally agreed that the average square foot of radiation emitted 240 to 250 B.T.U. From this arose the belief that 240 or 250 B.T.U. was the equivalent of 1 sq. ft. of radiation.

In engineering practice it is necessary to determine in B.T.U. the amount of heat lost from the space to be heated and then to replace this heat loss by installing radiation which will emit an equal number of B.T.U.

The size of this radiation was almost universally determined in accordance with tables similar to the one referred to, which appeared in the A.S.H. & V.E. *Guide*. By selecting and insisting upon the use of the most efficient types of radiators, the engineer assured his client economy, as well as heating satisfaction, for the manufacturer sold his product, as was proper, in actual square feet and the skill of the engineer enabled the client to heat with a minimum of surface. This condition has prevailed for years, up to the time of the appearance of tubular radiation. It was then that some genius hit upon the theory of "B.T.U. Square Feet." It was then that we began to hear a lot about comfort points, B.T.U. and Engineering Standards. We found out one spring morning that a square foot was not 144 sq. in. at all, but that it was 240 B.T.U.

Skeptics challenged, as skeptics will, some of these B.T.U. square feet, or ratings, when lo and behold, it was discovered that our *alma maters*, who, we thought, were turning out football teams and future presidents, in reality were devoting their energies to turning out radiator B.T.U. ratings.

This brings us to the latest development in the march of events which is the utterance issued last month by the Committee on Research of the A.S.H. & V.E. to the effect that:

"All manufacturers of radiators be requested by the Committee on Research to publish the ratings of their product in British thermal units. These ratings are to be certified and guaranteed, and for the present, at least, are to be based on condensation performance determined substantially in accordance with the tentative code of the American Society of Heating and Ventilating Engineers for testing radiators."

All of which means that there is absolutely nothing new about B.T.U. ratings of cast-iron radiators, except in their application to the margin of profit.

INDEPENDENT BODY SHOULD DETERMINE RATINGS

Some recognized body should:

(1) Measure and publish the actual heating surface of all tubular radiation.

(2) Test all tubular radiation for B.T.U. emission and publish and recommend the use of the results determined by the tests, or else prescribe conditions under which all tests shall be made and recognize only results certified as having been obtained under these conditions.

Manufacturers should publish their own and the Bureau of Standards measurements. They should also co-operate to obtain uniform test methods. In addition, they should jointly provide a central laboratory supported by them equally, engaging laboratory directors on long-term contracts and publish and guarantee the ratings and results obtained in this laboratory.

Uncle Sam does not accept B.T.U. ratings. The Bureau of Standards, for instance, has measured all cast-iron radiators and when Uncle Sam installs radiators, he buys square feet on the basis of 144 sq. in. to the square foot. He refers to these Bureau of Standard measurements and manufacturers are required to furnish enough additional B.T.U. or "catalog" square feet to equal the actual surface of radiators.

The standard specification of radiation issued by the Office of the Supervising Architect of the U. S. Treasury Department states:

"Especial attention is called to the fact that measurements made by the U. S. Bureau of Standards are used by the Office of the Supervising Architect in lieu of catalog ratings and it is a fact that no radiators so far measured, contain the superficial surface claimed in the various catalogs, and bidders must take this into account in submitting proposals.

"The U. S. Bureau of Standards recognizes no standard for measuring the superficial surface of a cast-iron radiator, other than the square foot of 144 sq. in."

R. L. N.

Pessimism and Optimism

MR. CHAIRMAN:

Quite a pessimistic note was struck in the opening paragraph of the first article to appear in the "B.T.U. Club." I refer to the following as extracted:

"With the increasing diversity of heating and ventilating apparatus and devices, the growing number of schemes and methods of heating, and the tearing down of old theories and standards without the furnishing of newer and better ones, it is necessary at times to hark back to basic principles."

The above sounds like a discourse on the awful end coming to the modern flapper and urges a return to the days of our grandmother. I particularly rise to object to the words "without the furnishing of newer and better ones" and I challenge anyone to prove the point with a single specific case, whether it is boiler ratings, radiator ratings or design, or what not.

The history of heating has been one of evolution, for which we are truly thankful. That it is more rapid at present with certain disadvantages, here to-day and gone to-morrow, should not detract from that commendable tendency to a more exact science.

Let's forget all about the old rule-of-thumb actual heating surface basis, as used in boilers and radiators, and measure them rather by their capacity in B.T.U., or going even a step further, let's measure them by their B.T.U. effect.

The weight or surface of a metal or casting means nothing if it propels most of the heat to the ceiling and leaves but little to me. What we like is the heat we feel—just give us the B.T.U. that gently strokes our bodies. So let's be consistent with the name of this club, forge ahead with the B.T.U. and forget the destructive criticism.

T. W. R.

Legal Decisions

Proof Necessary of Amount of Damages for Breach of Heating Warranty

In an action for the balance of the price of a hot air furnace installed in the defendant's residence, the defense pleaded was in the nature of a counterclaim based on the allegation that the furnace did not heat the house to 70° F. as warranted. There was no evidence as to what the cost might be to make the furnace perform according to the guaranty, nor as to its actual value at the time of purchase. The question was: What was the proper measure of damages?

The plaintiff contended that the general rule applied that where a purchaser retains the article sold, and it is not wholly worthless, the measure of damages is the difference between the actual value of the article at the time of sale and what its value would have been had it been as warranted. It was held, however, Meyer Furnace & Supply Co. v. Greenwell (Mo. App.) 297 S. W. 197, that in such a case the measure of damages is the reasonable cost of bringing the work to the contract specifications. In other words, it is the difference between the value of the furnace and installation as it was installed and the value of the furnace and installation as it should have been.

There was no evidence as to the amount it would cost to change the installation so as to make the furnace heat properly, although the defendant himself offered evidence tending to show that the trouble was with the installation and not with the furnace; in other words, that if the furnace were properly installed it had the capacity to meet the requirements of the contract. The trial court has allowed the defendant $300 on his counterclaim, but the appellate court held that as there was no evidence to support the judgment under the rule for the measurement of damages above stated, and the burden was on the defendant to prove the damages on his counterclaim, the judgment must be reversed and the cause remanded for new trial.

It appeared that a heating plan and specifications were agreed upon between the parties, and an additional written guaranty, made a part of the contract, provided that if the installation were done "in accordance with the heating plan and the material described . . . that we will guarantee the heating as per the above contract." There was undisputed evidence on the plaintiff's part that two of the furnace pipes or hot air ducts were changed, and other evidence tending to show that the defendant waived the guaranty by insisting on the changes. The defendant offered testimony tending to prove that these changes did not in any manner affect the plan of installation, but that the furnace failed to heat the house according to contract. The court considered that if the defendant was not responsible for any material change in the plans, he should not be denied redress, even if the installation was not exactly according to contract.

In an action for a balance claimed for work and materials furnished in the alteration and repair of a hot water heating plant, the defendant claimed that the boiler installed was not large enough to heat all the radiators and that the pipes were too small, and counterclaimed for the cost of remedying these alleged defects. It was held, Charles M. Oberlin Co. v. Wolverton, 157 N.E. 445, that testimony as to the plaintiff's experience and skill was not admissible, where it was not offered for the purpose of qualifying the witness as an expert. The admission of testimony for the defendant as to the amount it cost him to have the capacity of the boiler increased and the pipes and radiators enlarged was held not reversible error. Whether the changes made by the defendant in the plant were necessary in order to make it properly heat the building was held to be a question for the jury.

Gas House-Heating Rates

The Missouri Public Service Commission has permitted the Joplin Gas Company to put in force an optional gas rate for house heating in the city of Joplin, the existing rates to govern in the absence of agreement of the company and consumer to adopt the optional or reservation rate which is that known as the Doherty Three-Part Rate. This rate is broken up into three parts. The first part or commodity charge applies to the number of cubic feet of gas used by the consumer. The second part or charge is called the reservation charge. It is based upon the maximum quantity or number of cubic feet of gas the customer states he wants delivered per hour. The third part is the customer's charge, which is the same for all customers, regardless of the amount of gas taken at any time or the total amount of gas used per month.

The company's testimony showed that it expected to increase its revenues under the proposed rate by the sale of gas for house heating which its present schedule of rates does not encourage.

The city of Joplin did not object to the optional rate, but objected to its becoming effective in such a way that would make it compulsory; and it also desired that a reduction of the reservation charge should be made when it was found that a new customer had contracted for more gas per hour than he needed. This was held reasonable, as the company knows better than any one how much gas a consumer is likely to need when it has made a survey of his appliances; and it would be unfair to make a new customer who has signed a contract for a year for too large a demand keep to that demand for the whole year. The company, after the customer fixes his requirement, installs demand meters to limit the flow to the reservation. This minimum requirement is 30 cubic feet per hour.

The schedule approved includes a commodity charge per 1000 cu. ft. per month of 45c; a reservation charge per cubic foot of maximum hourly requirement per year of 32c; and a customer's charge per meter per year of $9.

The Michigan Public Utilities Commission approved an addition to the Central States Utilities Company's present gas rates schedule for the city of Grand Haven, covering the use of gas for house heating purposes exclusively. The new rate is 9.5c per 100 cu. ft. of gas used per month, with 1c per 100 cu. ft. discount if bills are paid within 10 days after rendition. A minimum bill is prescribed as follows: For the first heating season, one-third of the estimated cost of gas for the heating season, provided the minimum bill is not less than $50 or greater than $100. For each subsequent heating season, one-third of the cost of gas for the previous heating season, provided that any increased use of gas during such previous season caused by a colder or longer than normal heating season shall not be included in determining the minimum bill, and provided further that the minimum bill shall not be less than $50 nor greater than $100.

It appears to the commission that all gas sold under this rate will be during the winter months and will provide for the operation of the gas plant at a better load factor during such season than is now possible, due to the fact that much more gas is consumed in the territory served by the company during the summer months than is sold during the winter months. It, therefore, appears proper that gas sold for house-heating purposes may be sold at a less average rate than gas used for other household purposes.

The commission did not pass upon the reasonableness of the schedule and will change it at any time on motion of either of the parties or on its own motion as conditions may warrant. The Grand Haven City Council consented to the approval of the schedule without a hearing.

The commission made similar orders as to the gas house-heating service by the same company to the city of Monroe and the same kind of service by the Muskegon Traction & Lighting Company for the city of Muskegon.

The Trail of the Thermal Units

Smokegraphs Make Visible the Performance of Overhead Unit Heaters

Just Before Lighting Smoke Fusee

Fifteen Seconds After

Five Seconds After

Twenty Seconds After

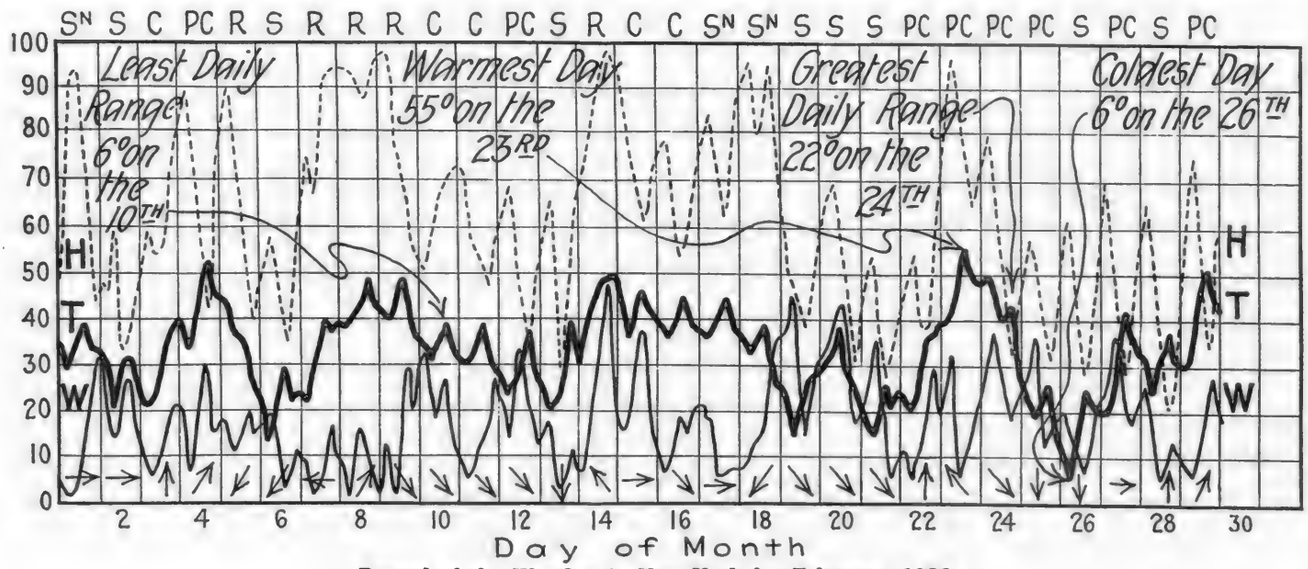
Ten Seconds After

Twenty-five Seconds After

A Smoke Bomb Was Ignited in the Heater Intake and Photographs Made Every Five Seconds. The Movement and Diffusion of the Heated Air Is Easy to Follow in the Successive Pictures

The Weather for February, 1928

	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, deg. F	55	54	59	52	62
Date of highest temperature	23	4	8	3	28
Lowest temperature, deg. F	6	—1	6	5	11
Date of lowest temperature	26	26	19	25	18
Greatest daily range, deg. F	22	36	25	27	30
Date of greatest daily range	24	5	22	19	19
Least daily range, deg. F	6	5	3	2	4
Date of least daily range	10	10	16	16	15
Mean temperature for month, deg. F	32.9	29.6	32.4	30.3	37.6
Normal mean temp. for month, deg. F	31.3	28.9	32.3	26.9	35.0
Total precipitation, this month, in	4.35	2.66	3.07	1.57	2.43
Total snowfall, this month, in	4.0	8.7	5.4	8.5	5.1
Normal precipitation, this month, in	3.82	3.50	2.66	2.14	2.63
Total wind movement, this month, miles	11575	6781	7915	7913	8412
Average hourly wind velocity, miles	16.6	9.4	11.4	11.4	12.1
Prevailing direction of wind	N.W.	N.W.	W.	N.W.	W.
Number of clear days	9	12	4	9	13
Number of partly cloudy days	9	9	6	6	4
Number of cloudy days	11	8	19	14	12
Number of days with precipitation	11	9	16	7	9
Number of days with snow	3	4	7	3	2
Snow on ground at end of month, in	None	None	0.1	Trace	2.3


Sn S C PC R S R R R C C PC S R C C Sn Sn S S S PC PC PC PC S PC S PC
Least Daily Range 6° on the 10TH
Warmest Day 55° on the 23RD
Greatest Daily Range 22° on the 24TH
Coldest Day 6° on the 26TH
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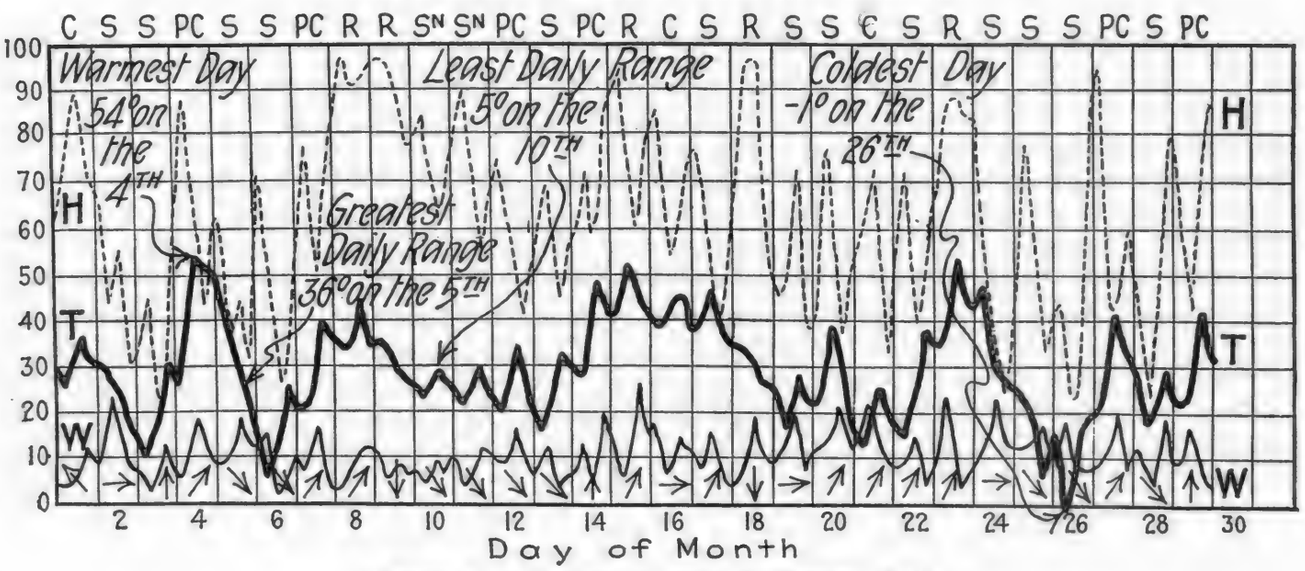
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in New York for February, 1928
(Hourly Observations of the Relative Humidity Plotted on this Chart)


C S S PC S S PC R R Sn Sn PC S PC R C S R S S C S R S S S PC S PC
Warmest Day 54° on the 4TH
Least Daily Range 5° on the 10TH
Coldest Day -1° on the 26TH
Greatest Daily Range 36° on the 5TH
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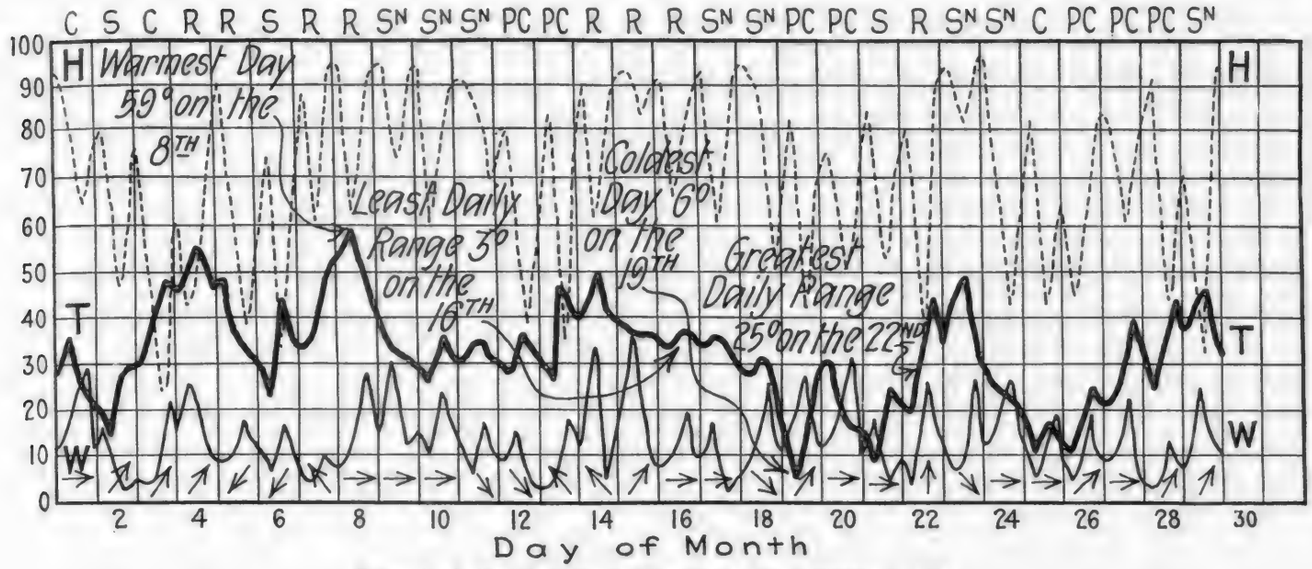
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in Boston for February, 1928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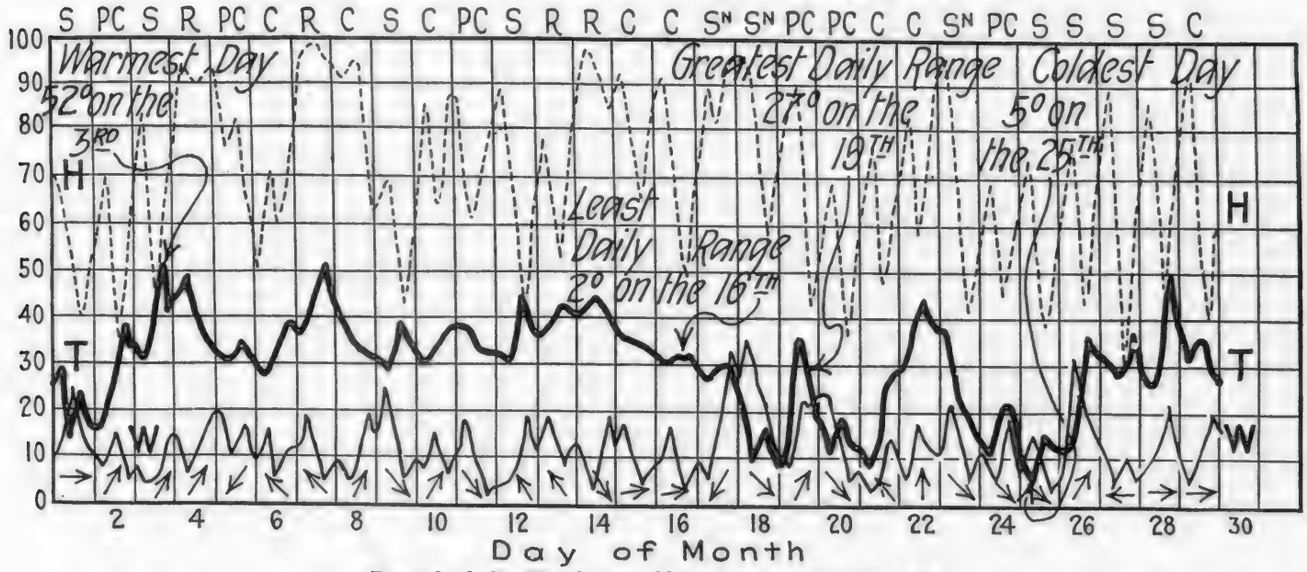
Warmest Day 59° on the 8TH
Least Daily Range 3° on the 16TH
Coldest Day 6° on the 19TH
Greatest Daily Range 25° on the 22ND
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in Pittsburgh for February, 1928


S PC S R PC C R C S C PC S R R C C SN SN PC PC C C SN PC S S S S C
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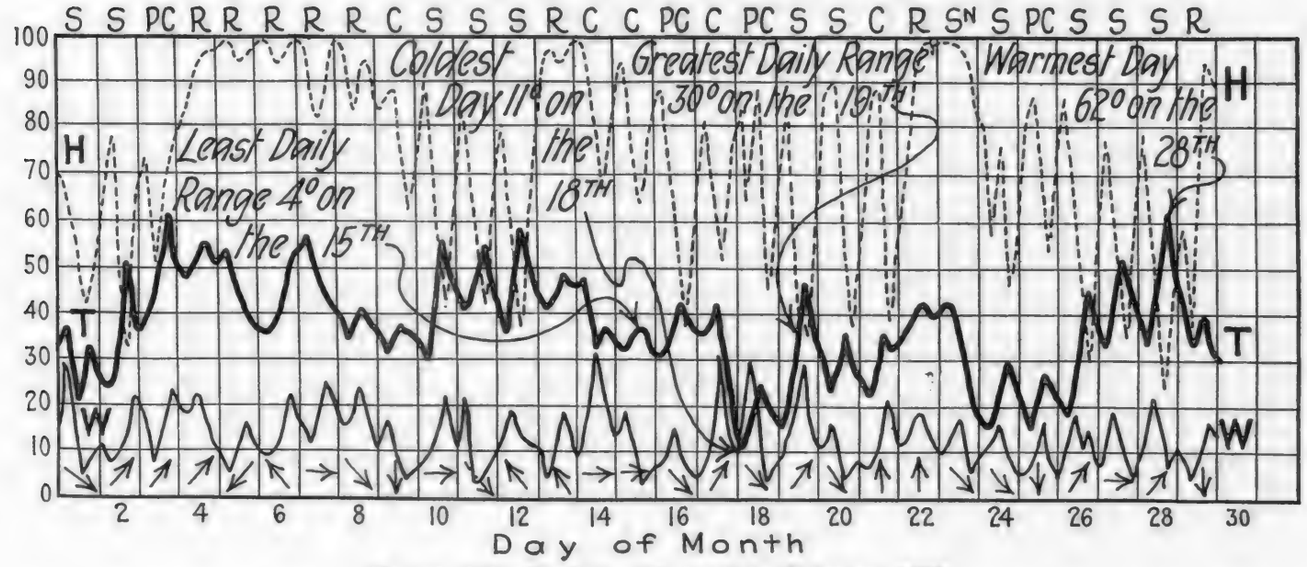
Warmest Day 52° on the 3RD
Least Daily Range 2° on the 16TH
Greatest Daily Range 27° on the 19TH
Coldest Day 5° on the 25TH
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in Chicago for February, 1928


S S PC R R R R R C S S S R C C PC C PC S S C R SN S PC S S S R
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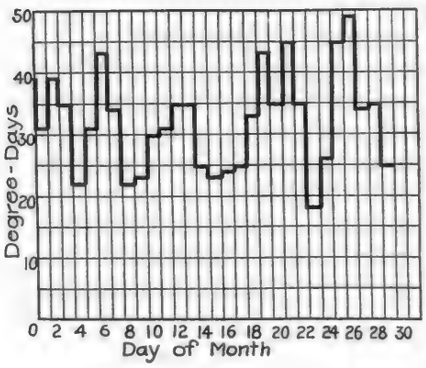
Coldest Day 11° on the 18TH
Least Daily Range 4° on the 15TH
Greatest Daily Range 30° on the 19TH
Warmest Day 62° on the 28TH
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in St. Louis for February, 1928

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.
Heavy lines indicate temperatures in degree F. Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage from readings at 8 A.M., 12 M., and 8 P.M. Arrows fly with prevailing directions of wind.
S—clear, PC—partly cloudy, C—cloudy, R—rain, Sn—snow.

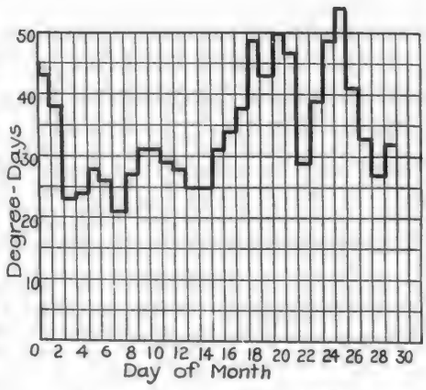
Monthly Heating Loads in Degree-Days In Five Typical Cities



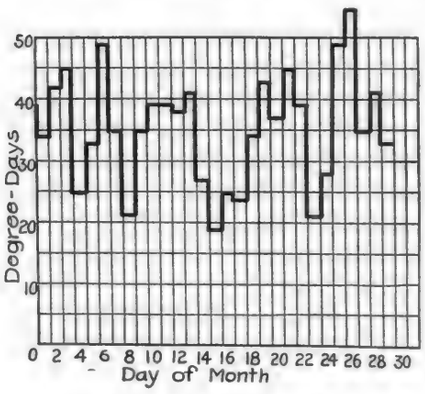
New York, February, 1928
Degree-Days 931—Degree-Days to February 29, 2780

PRACTICAL use may be made of these charts in almost every phase of the heating industry. The first charts appeared in the December, 1927, issue and they will be continued throughout the heating season. They show graphically the heating load in five cities in the United States as typical of the entire range in heating loads.

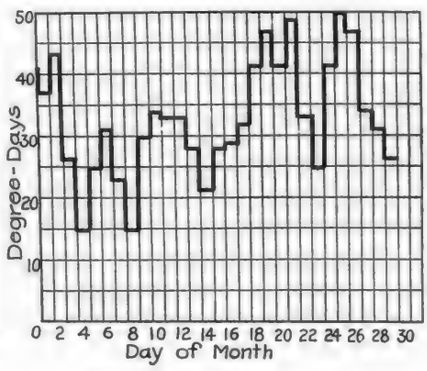
These charts are so drawn that they can be cut out and pasted end-to-end, giving the complete yearly heating load for any of the cities represented. An outline of the method of measuring the heating load by degree-days and illustrations of the varied applications will be found in THE HEATING AND VENTILATING MAGAZINE for September and November, 1925.



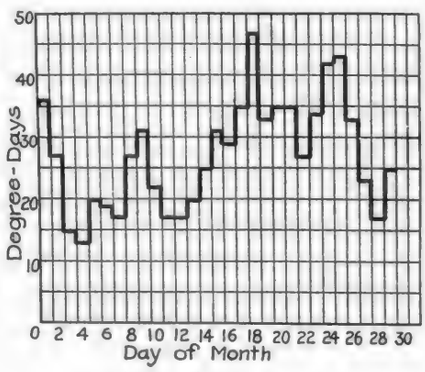
Chicago, February, 1928
Degree-Days 1006—Degree-Days to February 29, 3417



Boston, February, 1928
Degree-Days 1031—Degree-Days to February 29, 2921



Pittsburgh, February, 1928
Degree-Days 948—Degree-Days to February 29, 2979



St. Louis, February, 1928
Degree-Days 795—Degree-Days to February 29, 2743

Heating Industry in Canada Finds Use for Conditional Sales Act

A piece of legislation in Canada, known as the "conditional sales act," which was enacted some time ago, has been found to apply effectively to the heating and plumbing industries. Section 9 of this act reads:

"9. Where the goods have been affixed to realty they should remain subject to the rights of the seller or lender as fully as they were before being so affixed, but the owner of such realty or any purchaser or any mortgagee or other encumbrancer thereof shall have the right as against the seller or lender or other person claiming through or under him to retain the goods upon payment of the amount owing on them."

According to the act, radiators and similar units are chattels and, therefore, merchandise in the true sense of the word.

By filling in forms of the proper phraseology and having them signed by himself and the man or firm with whom he is doing business, the operator can still retain ownership of the particular merchandise he lists in the form, even though it is attached to realty, until it is fully paid for. Without the agreement duly signed and completed, the fixtures become part of the realty to which they are attached and their ownership passes out of the hands of the operator, even though he might never be paid.

Jobbers throughout Canada are supplying the two forms free of charge, the first form, known as "Contract for Plumbing - Heating Installation," contains space for listing the material and equipment, as well as the usual conditions regarding terms of payment, delays caused by strikes, fires, deliveries from manufacturers or wholesalers.

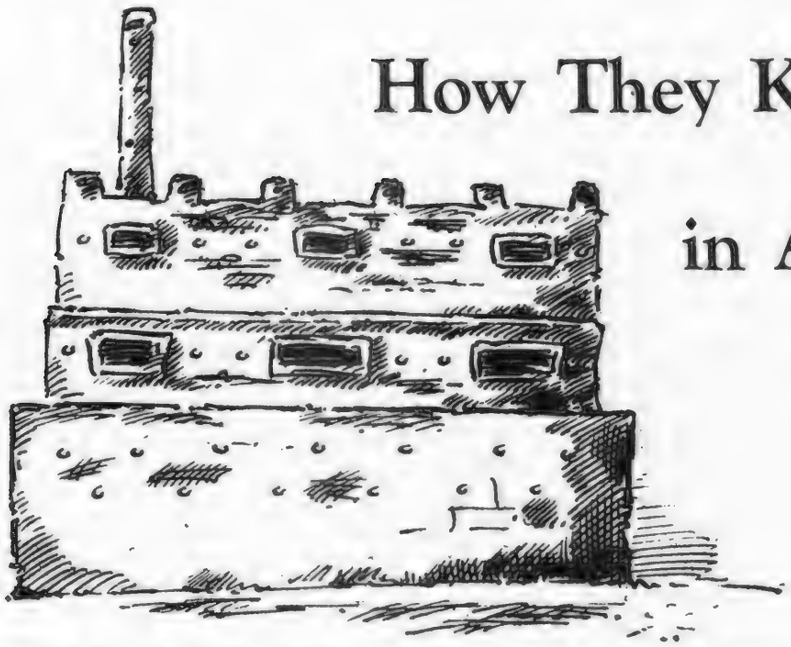
In the form entitled, "Order for Plumbing-Heating Merchandise," the conditions include the following:

"(c) That notwithstanding the affixing of the said Plumbing-Heating Merchandise and necessary accessories to any realty the same shall not be considered or deemed part of such realty of a permanent fixture until the total amount payable under this agreement is paid.

(d) That in case payment is not made when the same is due the Plumbing-Heating Contractor may declare all unpaid amounts hereunder forthwith due and payable and shall thereupon have the right, without any notice to me us or without process of law and without liability for trespass, to enter upon the premises where said Plumbing-Heating Merchandise and necessary accessories may be and take possession of and move the said Plumbing-Heating Merchandise and necessary accessories and may thereafter at the Plumbing-Heating Contractor's option retain the said Plumbing-Heating Merchandise and necessary accessories and all moneys theretofore paid, or may sell the same in accordance with the provisions of the Conditional Sales Act of Ontario and Amending Acts, and, in the event of there being a deficiency after such sale, I we covenant and agree to pay the amount of such deficiency."

How They Keep Warm in Afghanistan

By George Cecil



There Is Little Chance for Air Inleakage in this Afghanistan Fortified House

ALTHOUGH, throughout Afghanistan, summer's heat is more than oppressive, the winter, or "cold weather," as it is officially described, sometimes tries the strongest constitutions. Hardy though the Afghans are, from December to March venerable peasants die from exposure—whether in their hovels or crossing the mountains and fighting the ice-laden blizzards which attack the rocky passes. Fortunately, those who can afford the comfort yielded by a solidly-built house succeed in keeping the cold at a more or less respectful distance, especially in the low-lying parts of the Amir's domains. But the rural home is a very different proposition; the agriculturist's structure affords a poor shelter from the "stormy blast." The very marrow in the chilled inmates' bones is frozen.

The occupants of the modest homestead are not so badly off during the day; for, being on the move, they remain pretty warm. At night, however, the small cultivator and his family often shiver, even though the little sleeping-room is crammed with human beings, each of whom is rolled in a thickly wadded counterpane; all thank Allah when morning comes. As the native proverb so aptly expresses it, a winter's night is man's unseen enemy.

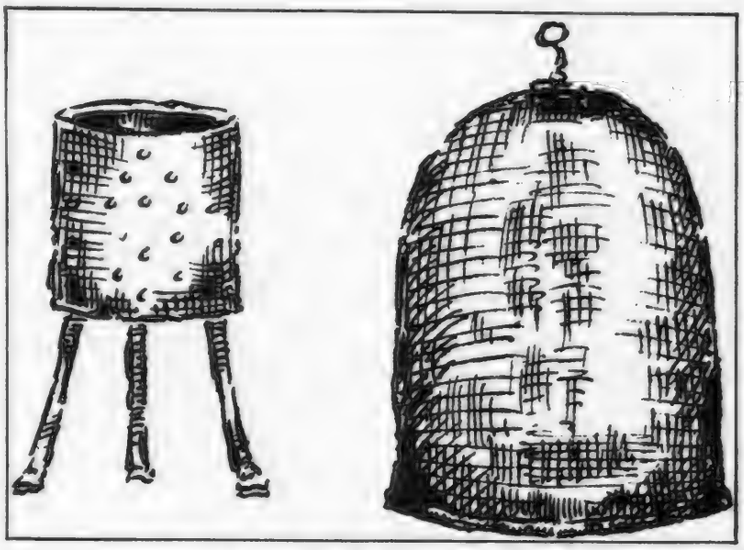
In the wilds the houses usually are loopholed, so that marauding tribesmen may be kept at a distance with the assistance of a jhezail (rifle). A many-holed wall scarcely conduces to warmth; immunity from drafts is, under these circumstances, rendered impossible. Rheumatism follows.

SCREENS AND CURTAINS

In Kabul (the capital), Kandahar, and other towns inhabited by the rich and great, as well as in the larger townlets, some attempt is made to combat chilly weather. The walls are thick, and, loopholes having no part in the builder's scheme, drafts are practically unknown. Besides, great screens and heavily-curtained doorways help to drive away the cold air; the windows are covered in a similar manner. The last-named, by the way, seldom are opened in winter time, and with the result that each abiding place reeks horribly. The Afghan, luckily, does not mind a stench; for him an odoriferous atmosphere spells comfort. Dost Mahomed asks nothing better.

Fireplaces seldom are in demand; the householder, very properly, arguing that little is to be gained by heating the chimney. So he avails himself of a brazier, which, standing on a sheet of tin or iron, diffuses warmth and comfort. It sometimes does more, for, a careless servant, omitting to watch the receptacle, live ashes reach the carpet. The master of the house may return to find his domicile in flames and treasured possessions utterly destroyed. Dost Mahomed then waxes very wrathful, even going to the length of bringing a serious charge against the trembling domestic. The unhappy man finds himself lodged in jail for having wilfully caused the fire, though incendiarism was the last thing to have entered into his mind. The poor wretch may remain in prison a considerable time—perhaps to die of cold long before the sentence has completely been served. Hard is the victim's Kismet.

The braziers occasionally are covered by a sort of wire cage, a recent invention, the meshes of which are so arranged that no spark, not so much as the fraction of one, can reach anything inflammable. But the older school of Afghan, hating an innovation, no matter



Typical Afghanistan Brazier and Its Cage

how useful it may be, sternly declines to fence in the fire. "My father and all his forebears kept birds in cages," bitingly argues the stubborn one. "Pray is a brazier to be treated like a bird?"

NO CENTRAL HEATING

In the 'nineties when Abdur Rahman was the much-feared Amir, the late Salter Pyne, an Englishman, who advised the Government in various important matters, introduced stoves of the German type. They were adopted in the Royal Palace and by the State and Court officials, the ruler insisting upon his dependents moving with the times. Other "notables," bent on currying favor with the "Light of Lights" and the "Father of All Cleverness," as the potentate was named by tactfully-inclined sycophants, followed suit, and greatly to their advantage. Others, flatly refusing, reviled Pyne as a meddler, an officious person who to gain his own ends introduced in Afghanistan contrivances which served no good purpose. Abdur Rahman quickly put a stop to all such grumbling by imprisoning the malcontents and confiscating their property. "I, your Amir, by the grace of Mahomed, have countenanced stoves," thundered the not-to-be-denied dictator. "Must I then be criticized by dogs and sons of dogs?" Criticism soon gave place to discreet silence.

Pyne, immensely elated at having completely triumphed, next proposed the European system of central-heating for the Palace, to which Abdur Rahman would not agree. Though seeing further than his fellows, the Monarch often proved very stubborn, and for some unknown reason he refused pointblank to entertain the "undesirably novel and daring idea." His scared advisor, probably fearing an untimely end in place of retirement to his native England, did not press the matter, and upon the arrogant Monarch's dying some years ago he quickly left Afghanistan. The new ruler, caring little for progress, allowed the Afghans to warm themselves as they pleased. Stoves gave place to braziers; interference was unknown.

The present Amir is all for progress, and heating contrivances, it is understood, have his attention. When recently in Italy he asked innumerable questions about the Italian method of warming houses, and during the contemplated visit to the United States further information doubtless will be sought. Never has the East known so advanced a potentate.

Research Fellows to be Appointed at Wisconsin

Two research fellowships in engineering are to be awarded by the University of Wisconsin, April 30. Candidates must be graduates of engineering colleges of recognized standing, and, preferably, should have had one or two years of graduate study, of teaching, or of engineering experience. Applications will be received up to April 15. Information and application blanks can be obtained from Dean F. E. Turneaure, College of Engineering, Madison, Wis.

The appointments will be for a period of two years, subject to satisfactory service, and the salary will be $900 for the first year and $1100 for the second year. A fellow will be expected to devote not less than half time to assigned research in the College of Engineering, but will be given an opportunity to complete the requirements for a master's degree within the two-year period. The period of service will be the usual academic year.

New Hoffman Motion Picture Features 1928 Sales Campaign

"CONTROLLED Heat" is the title of a motion-picture film announced by the Hoffman Specialty Co., New York, as the feature of its 1928 sales campaign. The company found the Ann Pennington picture "Heat Thief," produced and distributed last year, to be such a valuable adjunct to its sales scheme that the new film came as a matter of course.

The story traces the heating problems of the human race and their solutions, from the times of the caveman down to the present. A large portion of the film follows the experiences of a hypothetical Mrs. Wilson, who is determined to have only the best heating system in her new home. It naturally happens that the heating contractor, who is called into consultation, recommends Hoffman controlled heat and, by the aid of skillful, diagrammatic animation, the entire story of the operation of a system under Hoffman control is clearly portrayed. For the first time, the operation of a vapor vacuum heating system is graphically depicted on the screen.

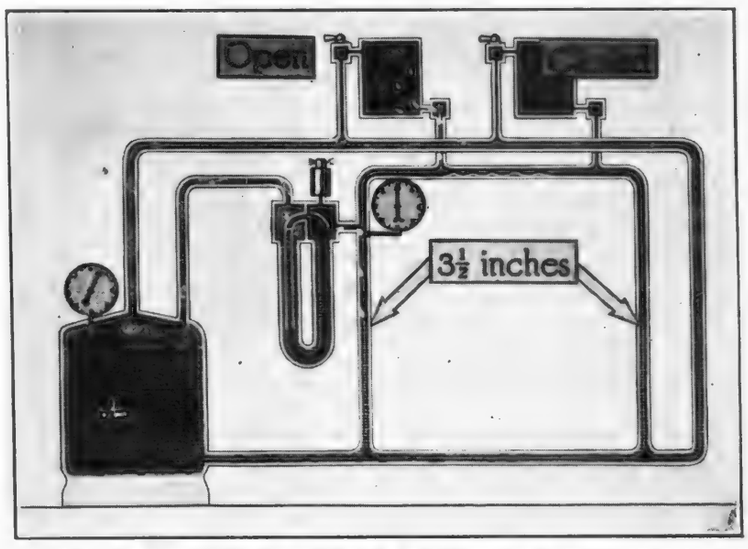
Another interesting part of the film depicts George D. Hoffman, founder of the Hoffman Specialty Company, at work in his factory working out the Hoffman differential loop. The entire story is held together with the background of Mrs. Wilson's progress in heating her home.

Private showings of this film are being scheduled in many cities. Drawing attention to this picture, a series of full-page advertisements is being released in the engineering and trade journals and announcements are being mailed to engineers, contractors and architects.

Believing that the laying out of a vapor vacuum system belongs in the hands of competent architects or professional engineers, the Hoffman Specialty Company has established connections with a group of independent consulting engineers nationally recognized as being among the leaders of their profession.

These engineers are: S. R. Lewis, Chicago, Ill.; Walter E. Gillham, Kansas City, Mo.; Hubbard & Wagschal, Detroit, Mich.; J. C. Moore, Seattle, Wash.; Alfred Kellogg, Boston, Mass.; The Markel Company, Atlanta, Ga.; Haynes Selling Co., Inc., Philadelphia, Pa.; Elliott Lee Ellingwood, Los Angeles, Calif.

They will furnish to the architect complete heating plans and specifications where a Hoffman controlled heat system is to be installed. This service is offered without cost to heating contractors as well as the architect. In addition thorough inspection of the job will be made by one of the Hoffman staff composed of qualified and practical men always ready to co-operate and advise.



One of the Animated Drawings Illustrating the Operation of Hoffman "Controlled Heat"

American Society of Heating and Ventilating Engineers

Holland Tunnel Medal Presented to President Willard

President A. C. Willard, head of the Department of Mechanical Engineering, University of Illinois, has been awarded a bronze medal commemorating the recent opening of the Holland Tunnel under the Hudson River between New York and New Jersey. The medal was presented by the New York State Bridge and Tunnel Commission and the New Jersey Interstate Bridge and Tunnel Commission, as a mark of appreciation for the professional services rendered by Professor Willard in connection with the ventilation investigation of the twin traffic tubes.

Professor Willard, who is a nationally-recognized authority in heating and ventilating engineering, was appointed in 1920 a consultant on ventilation to the chief engineer of the tunnel, the late Clifford M. Holland.

Samuel R. Lewis Re-elected Chairman of the Committee on Research

In announcing the program of the Committee on Research for the ensuing year, Samuel R. Lewis, who has been re-elected chairman of the Committee on Research, states that the Research Endowment, founded by the Illinois Chapter, has received the endorsement of the Committee on Research. The committee also has agreed that in future the chairman should be selected for the ensuing year no later than November 30. In order to inject new life into the technical work of the laboratory, it is planned to change the personnel of the technical advisory committees frequently.

One of the new activities of the committee will be co-operative research with a university to study gases encountered in garages.

President Willard Guest of Michigan Chapter

President A. C. Willard was the guest of the Michigan Chapter at its March meeting held March 12, at the Imperial Hotel, Detroit, when 75 members and guests extended him a warm welcome. Professor Willard's address was devoted mainly to a description of the research work carried out at the University of Illinois to determine air requirements, etc., in the ventilation of tunnels, with particular reference to the Holland Vehicular Tunnel.

An invitation was extended to the chapter by E. E. Dubry to be the guests of the Detroit Edison Company on the occasion of its April meeting.

Illinois Chapter Hears Talk on Thermal Engineering

Daniel Lindsay, of the Carrier Engineering Corporation, addressed the Illinois Chapter, at its March meeting, on "Thermal Engineering," covering past, present and future practice. The meeting was held at the Hotel Sherman, Chicago, March 12, with an attendance of 108 members and guests. In his talk, Mr. Lindsay stressed the necessity for greater co-operation between the heating and ventilating engineers, refrigerating engineers, architects and contractors.

Willis H. Carrier, who was scheduled to speak on "The Outlook in the Field of Heat Engineering," was detained by illness, but wired that he would give his talk at the April meeting, if possible.

Robert E. Hattis, of W. L. Fergus & Company, was elected a member of the chapter.

Pacific Northwest Chapter Organized

At a meeting at the Engineers' Club, Seattle, Wash., Thursday evening, February 2, the Pacific Northwest Chapter of the A.S.H. & V.E. was organized. Officers were elected and a constitution and by-laws was adopted and has been submitted to the council of the society for approval.

It is planned to hold the annual meeting of the chapter in April, until which time the following officers and board of governors will serve: President, W. L. Dudley; vice-president, E. L. Weber; secretary, E. O. Eastwood; treasurer, C. F. Twist. Governors: E. L. Weber, C. F. Twist, and W. E. Beggs.

A second meeting was held on March 8, the speaker of the evening being Dr. E. P. Hanley, health commissioner of Seattle.

Kansas City Chapter

C. A. Thinn, chief engineer of the C. A. Dunham Company, was the principal speaker at the February meeting of the Kansas City Chapter, held at the Ivanhoe Masonic Temple, February 13. There were 60 members and guests in attendance. Mr. Thinn devoted his talk to sub-atmospheric steam heating, and illustrated his points with charts and lantern slides.

Perry West as Technical Advisor

It has recently been decided to have a technical advisor for the A.S.H. & V.E., and Perry West, of Newark, N. J., was designated to handle this work in accordance with the regulations prepared by a special committee of the council outlining his duties.

Standard Conductivity Coefficients for Building Insulation

A statement in the report of the A.S.H. & V.E. Committee on Standard Test Code for Heat Transmission Through Walls to the effect that "coefficients of conductivity as determined by the guarded hot box method shall not be regarded as the standard coefficients of conductivity," it should be pointed out, refers to the overall heat transmission of the walls. It was the thought of the committee that, with the variety of wall constructions in common use containing building insulation, it would be impracticable to establish standard coefficients for such walls. As was stated in the report "the homogeneous installation materials themselves will be tested for conductivity by means of the guarded hot plate." The construction of the apparatus and the procedure recommended by the U. S. Bureau of Standards (*Journal* of the A.S.H. & V.E. Vol. 26—No. 7, October, 1920) will be followed and the temperature of the surface of the materials shall be regarded as that of the plates on each side. It is further provided that the test specimen shall be 1 ft. x 1 ft. In order that results from different laboratories may be comparable, it is specified that tests shall be made at a mean temperature of 60° F. and upon dry material.

Coefficients secured by the hot plate method on homogeneous materials will be recognized as standard.

Conditioned Air for the Capitol

A technical advisory committee, composed of F. R. Still, New York; Frank Irving Cooper, Boston; A. M. Feldman, New York; D. D. Kimball, New York; Prof. A. C. Willard, Urbana, Ill.; R. E. Hall, New York, and Prof. C.-E. A. Winslow, New Haven, Conn., went to Washington, February 10, at the request of David Lynn, architect of the Capitol, and formulated recommendations which, if carried out, will result in air conditioning equipments being installed in the Capitol building. An appropriation will be requested by Congress to provide for controlled ventilation in accordance with the report of the committee.

Heating and Piping Contractors National Association

Board of Directors Discuss Association Activities

No less than 51 applications for membership were presented by E. W. Verity, chairman of the Membership Committee, at the Spring meeting of the board of directors of the Heating and Piping Contractors National Association, held in New York, March 5-6. Those in attendance were: Walter Klie of Cleveland, chairman; William M. Anderson of Philadelphia, Harry M. Hart of Chicago, Frank W. Howard of Boston, Horace W. Jones of Rochester, N. Y., John S. Jung of Milwaukee and James S. McVey of Pittsburgh.

The fact was brought out that the association is stronger in membership to-day than at any time in its history. Thirty-two local associations are now affiliated with the national association.

For the Committee on Standardization, Chairman Ralph S. Franklin reported that in addition to the completion of the data on pipe sizes, his committee has compiled a set of factors for insulated walls. These data cover cork board and fiber board used with the more common types of building construction.

As has already been announced in these columns, the new standards for cast-iron screwed fittings, malleable-iron screwed fittings and steel pipe flanges and flange fittings have been finally approved by the sponsor organizations. In addition, it is announced that the standards for cast-iron flanges and flanged fittings for 125 lbs. pressure and 250 lbs. pressure have received final approval and will soon be printed.

In connection with the standards for long-turn sprinkler fittings, which were submitted for the three sponsors' approval, it was announced that on recommendation of the Committee on Standardization, the board of directors of the H. & P. C. N. A. voted to approve these standards for submission to the American Engineering Standards Committee for final action.

Herbert A. Snow, chairman of the Committee on Certified Heating, told of the completion of the direct-mail advertising campaign with eleven associations participating. It was decided to devote the Wednesday morning session of the association's annual convention in Philadelphia, June 6, to the problems arising in the field of standardization and certified heating.

Portland H. & P. C. A. Incorporates

Portland (Ore.) Heating and Piping Contractors Association was incorporated early in February with a capital stock of $1500. Charles T. Gibson, H. H. Colliver, newly elected president of the Portland Master Plumbers' Association, and Eugene Ruedy were the incorporators. One of the objects of the association is to establish "Certified Heating" in Portland; also to install an engineering department for checking plans and inspecting installations. Offices of the association are in the Sherlock Building, having been moved from the Multnomah Hotel.

Contractors in Nine Cities Start Certified Heating Advertising Campaign

Nine local associations of the Heating and Piping Contractors National Association have co-operated to carry out direct-mail advertising campaigns featuring Certified Heating in their respective areas. The campaign consists of six pieces of literature, done in color, telling the story of Certified Heating in an attractive manner. It was prepared by advertising experts under the direction of the Committee on Certified Heating of the National Association, of which Herbert A. Snow, of Boston, is chairman.

The local associations co-operating in this initial effort are those in Cincinnati, Milwaukee, Newark, Norfolk, Philadelphia, Portland, Ore., St. Louis, Sheboygan, Wis., and Washington, D. C.

The Certified Heating program can be adapted to any community large enough to provide reasonable financial support, and assures the heating contractor of an up-to-date method of merchandising his services. The Heating and Piping Contractors National Association has worked out a definite program for establishing Certified Heating, which will be sent to any heating and piping contractor upon request.

Example of Literature Used by H. & P.C.N.A. to Advance Certified Heating

New York State Heating Contractors Hold Annual Meeting

A notable group of speakers addressed the thirty-third annual convention of the Heating and Piping Contractors New York State Association, held in Buffalo, March 6-7, including President Arthur C. Willard, of the A.S.H. & V.E.; President Harry M. Hart, of the H. & P.C.N.A.; Ralph C. Taggart, chief engineer of the New York State Department of Architecture; President Cecil W. Farrar of the Excelso Products Corporation; Samuel Botsford, secretary of the Buffalo Chamber of Commerce; William Taylor, executive secretary of the New York City Association and J. H. Bucknam, development engineer for the Linde Air Products Company.

Mr. Hart, in his address, gave details of the certified heating movement in Chicago and pointed out the fact that approximately $20,000 per year is expended by the Chicago association in advertising certified heat. He urged heating associations to employ full time secretaries and reiterated his plea for separate organizations of heating and plumbing associations.

Mr. Farrar's subject was: "Do Owners Buy Heating Equipment or Do Contractors Sell?" He pointed out that the average contractor is still bidding, instead of selling, and he urged the contractors to adopt modern selling methods in conducting their business. He also emphasized again the importance of selling "heating comfort" rather than just merchandise. Mr. Bucknam's talk was on pipe welding.

New officers elected are President Martin W. Utz, Rochester; vice-president, William J. Olvany, New York; secretary and treasurer, Robert Miller, New York; recording secretary, Harry Snyder, Rochester; directors: William G. Fraser, Buffalo; Arthur Jensen, Geneva, and Floyd Sharp, Jamestown.

Following the meeting the convention banquet was held at the Hotel Buffalo where the speakers included Harry M. Hart, Archer Landon, president of the Landon Radiator Company, and T. F. Carson, executive secretary of the Detroit Association of Sanitary Engineers.

The toastmaster and retiring president, William G. Fraser, then called upon A. R. Herske, manager of the Heating and Piping Contractors Cleveland Association, who delivered the main address of the evening on "What is the Future of the Heating Contractor?" He urged the contractors to become better business men and illustrated his points by detailing the work of the Plumbing and Heating Industries Bureau in making radiator heat attractive.

Itinerary of Heating Contractors' Field Man

In a swing around the circle Edward G. Byrd, field representative of the Heating and Piping Contractors National Association, will visit practically all of the important States before the date of the association's annual convention in Philadelphia, June 4-7. Starting out on March 12, Mr. Byrd stopped at points in New Jersey, New York, Pennsylvania, West Virginia, Ohio, Kentucky, Indiana, Missouri and Illinois. The balance of his itinerary is as follows.

April 9-19, Wisconsin; April 20-21, Duluth, Minn.; April 23 to May 3, Minneapolis and St. Paul; May 4-5, Omaha, Nebr.; May 7-8, Denver, Colo.; May 9, Kansas City, Mo.; May 10, St. Joseph, Mo.; May 11-12, Wichita, Kan.; May 14-15, Tulsa, Okla.; May 16, Springfield, Mo.; May 17, Memphis, Tenn.; May 18, Little Rock, Ark.; May 21-22, Birmingham, Ala.; May 23-24, Atlanta, Ga.; May 25-26, Chattanooga, Tenn.; May 28, Nashville, Tenn.; May 29, Knoxville, Tenn.; May 31 to June 1, Greensboro, N. C., and June 2, Philadelphia.

Newark Association's Annual Beefsteak Dinner

Heating and Piping Contractors Newark Association will hold its fourth annual old-fashioned beefsteak dinner on Wednesday evening, April 11, at the Washington Restaurant, 559 Broad St. The committee in charge is Fred J. Engelberger, chairman, George L. Dennis, and Royal S. Smith.

Officers Elected in St. Louis

Heating and Piping Contractors St. Louis Association has elected the following officers for the ensuing year: President, J. L. DeNeille; vice-president, J. E. Strong; secretary, F. F. Gunn; treasurer, L. W. Moon; sergeant-at-arms, J. E. Westbury.

Deaths

THOMAS E. HOYE, president and treasurer of the Thomas E. Hoye Heating Co., Milwaukee, Wis., died at the Columbia Hospital in that city at the age of 74. Mr. Hoye founded the company in May, 1906. He served as commissioner of public works in Milwaukee from 1904 to 1906. The business will be carried on by Joseph H. Volk, who was associated with Mr. Hoye for many years.

GEORGE A. EAGAN, a member of the firm of Eagan & Beahm, Inc., Philadelphia, died at his home in Woodbury, N. J., February 1, at the age of 43. Mr. Eagan graduated from Cornell University in 1906 with the degree of M.E. For several years he was associated with Babcock & Wilcox Company, and afterwards with Warren Webster & Company. During the World War he was a captain in the Ordnance Department.

Proper Humidity Prevents Accidents in Dry-Cleaning Plants

THE discharge of static electricity in dry-cleaning plants constitutes a well-known hazard. Static electricity is carefully generated through the relative movements of different materials. Specifically, for instance, when textiles of various kinds are rubbed together. The "static" electricity thus generated is "electricity at rest" and may be considered as minute electrical charges, well distributed over the surfaces of the material.

As moisture is well known to be an excellent conductor of electricity, it appears obvious that on dry surfaces, these minute charges will remain in their distributed form. As long as the material is moist, the charges will run together and dissipate themselves rather than remain and accumulate until sufficient voltage is built up to cause a spark. This subject is of considerable importance in the consideration of proper atmospheric conditions for enclosures where dry cleaning is done.

If clothes are tumbled on first starting through the cleaning process, they could be humidified at this point.

DANGER OF MIXING WET AND DRY GARMENTS

Wet spots or wet garments in a washer with other garments which are extremely dry would develop particularly dangerous conditions, as the wet garments would act more or less as a condenser and would accumulate large charges. One wet garment, or a wet spot on a garment, will no more humidify the rest of the clothes in a washer than a goldfish bowl full of water will humidify the air in a room.

One mistake made in dry-cleaning plants is that of maintaining humidity by the discharge of steam jets into the room. This practice is much better than having no humidifying means at all, but it tends to increase the temperature of the room and bring it more nearly to the ignition temperature of the gasoline vapors. Therefore, it would be highly desirable to maintain humidity by the use of sprays of cold water as is accomplished in an air washer, thus keeping the temperature down and the humidity up.

DANGEROUS CONDITION WHEN FROST CRYSTALLIZES MOISTURE

Probably the most dangerous conditions occur at the time of the year when frosts at night crystallize all of the moisture out of the air and during the day the temperature rises from 50° to 70° F., thus creating during the middle of the day an extremely dry atmosphere. Under these conditions, which occur most during the months of May and October, the workmen open the windows and doors of the plant during the day, which allows this extremely dry air to dry out everything inside the plant. This combined with the fact that the drivers are bringing in very dry clothes from all over the town creates extremely dangerous combinations.

During cold winter weather the doors and windows are more likely to be kept about right. It is when doors and windows are opened and the out-door air itself is very dry that the greatest danger develops, because it is no more practical to "humidify all out of doors" than it is to "heat all out of doors." To create ideal conditions ventilation should be provided by drawing air from out of doors through an air washer, thus providing constant humidified ventilation throughout the year, and of course windows and doors should then always be kept closed.

MOISTURE MUST BE ABSORBED BY MATERIALS

It must be definitely understood that the fact that the air in the cleaning room is properly humidified will do no good of itself alone in preventing the occurrence of static sparks. No amount of humidity in the air can carry away the static charges or keep the electricity from being created. The point is this. If material such as wool, silk, fur, leather belting, wooden tables is extremely dry, the electricity created by movement accumulates in the different places where it is formed until sufficient voltage is generated to cause sparks to jump. If the relative humidity in the room is fairly high, say 70%, the material in the room will take on a corresponding humidity. This humidity in the material in the room makes the material a slight conductor of electricity so that when electricity is generated by movement it flows through the material and dissipates itself instead of accumulating high enough voltages that sparks are created.

Maintaining a correct humidity in the cleaning room must be done, but it is not enough. The clothes must stand in a room where properly humidified air is circulating for at least an hour before they are handled in order that they may attain a humidity themselves corresponding to the humidity of the air in the room. In hurry-up cases garments may be carefully steamed, being careful not to wet the garment but only to humidify it. It is this humidity in the garments themselves, and in the workmen's clothes, and in the wooden tables, and in the leather belts that constitutes real protection and will eliminate danger of fires due to static sparks.

Garments brought in from very dry homes will probably cause washers to "pop" even though the humidity in the room is correct, unless they have had sufficient time hanging in a humidified room to become humidified themselves.

In a drying tumbler, the humidity must be maintained by tempering the drying air with a steam jet.

Winners in A. B. P. Editorial Contest Awarded Certificates

HALF a hundred well-known editors, members of the National Conference of Business Paper Editors, gathered in Washington, March 12, for their annual "Hoover Dinner." The day's progress was initiated by a visit to the home of William H. Taft, chief justice of the U. S. Supreme Court. The chief justice greeted his visitors individually in his library and spoke briefly on the part they could play in national affairs through their influence in the various industries.

At the luncheon held at the Hotel Washington, the guest speaker was Dr. Julius Klein, director, Bureau of Foreign and Domestic Commerce, who addressed the members on the importance of leadership in their respective fields. Dr. Klein was very frank in his statement that many editors and business-paper owners could more definitely exhibit courage in their handling of important problems and in assuming leadership in their industries, than in following the road mapped out by industrial executives.

Short addresses also were made by W. A. Wolff, publicity department, Western Electric Company, and David Beecroft, vice-president, Chilton Class Journal Company, the last named having been chairman of the jury of awards for the Associated Business Papers in the recent contest.

The names of the winners of prizes and of honorable mention were then read and certificates awarded.

As announced last month, this list included an award of honorable mention to P. E. Fansler, associate editor of THE HEATING AND VENTILATING MAGAZINE, for his article on "Some Thoughts on the Combustion of Oil," published in THE HEATING AND VENTILATING MAGAZINE, April, 1927. There were four honorable mentions in the sixty-three papers submitted.

CONDITIONS IN INDUSTRY WHICH DEMANDED ATTENTION

Mr. Fansler, who was present, was called on to tell of the developments which led to the preparation of his article.

He briefly outlined the disquieting condition that existed in the oil-burner industry two or three years ago, due to the wave of the ill-advised advertising that all but got beyond control of the manufacturers themselves. Referring to the flood of letters that followed the appearance of a series of articles he had prepared for *Good Housekeeping*, about two years ago, Mr. Fansler said: "I was amazed at the number of home-owners who wrote, 'In my experience I have come to believe that all oil-burner salesmen are liars. Each tells a different story and insists that his burner is the only one that will burn oil properly, or at all. If each is telling the truth, certainly all the others are liars.' Letter after letter contained this thought, nearly all as bluntly expressed. This experience quickly brought me to a realization that, unless this grotesque practice were stopped, there would be built up a sales resistance that would prove an effective barrier to future development, even to those manufacturers who did not participate in it.

"One mathematical genius of that time was reported to have calculated that it required ten thousand words to effect the sale of one burner. It is no wonder, for much of the literature of that time included, in that ten thousand words, at least nine thousand adjectives.

"As I have intimated, ordinary adjectives became so common as to lose their potency, and high-pressure adjectives came into being. No manufacturer could sell a burner that was quiet—it had to be noiseless; then absolutely noiseless; and that was not quiet enough, so the 'super-noiseless' burner came into being, and you can hear these new models in many homes to-day."

LOOSE SALES TALK DOES NOT PAY

Mr. Fansler then told of the article "Does Loose Sales Talk Pay?" and of the general acceptance, by the oil-burner industry, of the fact that it did not pay as is evidenced by the almost complete disappearance of such terms as "nebulized," "principle of unit action," "triple atomized," "aero-atomization" and "aireation" from the literature of the industry. The desirability of presenting a simple story of the phenomenon of combustion, where oil was burned, led to the writing of "Some Thoughts on the Combustion of Oil Fuel," the article on which the award was made.

In this connection, Mr. Fansler said: "I distinctly disclaim any originality in the way of combustion theories. I merely set forth, in what I hoped was simple and lucid phraseology, the technology of oil combustion as expounded and accepted by modern chemists and physicists. So many readers, especially those who were reluctant to part with their pet hallucinations, thought that these articles presented 'Fansler's theories' that I was led to make specific disclaimer, editorially.

"It is encouraging to tell you that there has been quite a general adoption of the correct presentation of this matter in oil-burner catalogs and other literature. Some manufacturers have copied portions of these articles verbatim, acknowledging the source.

"I believe a definite good has resulted from this campaign. Oil-burner catalogs of to-day come pretty close to telling the same story. Salesmen naturally follow the lead of the manufacturer. Sales resistance to oil-burner sales undoubtedly is much less than it would have been had this cancer been allowed to become firmly entrenched in the industry. That means that more oil burners will be sold, and more purchasers will be satisfied, because they were not promised impossible achievement."

The members of the conference met for dinner at the Press Club, this being the sixth "Hoover Dinner" of the conference. Questions prepared at the luncheon were submitted to the Secretary for his comments and, with the utmost freedom and frankness, Mr. Hoover discussed subjects as varied as the interests of the many papers represented.

Philadelphia's Plumbing and Heating Development Plan

Details have just been announced of the promotion plan of the Philadelphia Plumbing and Heating Development League. In addition to stimulating a keener public consciousness of the vital importance of heating and plumbing materials correctly installed, it is the object of the league to promote harmonious relations between the various interested groups to the end that unsound trade practices may be eliminated.

Some of the activities proposed in the plan are an analysis of present sales volume, market analysis, retail outlet survey, door-to-door selling, collective advertising, sales training, merchandise display, civic-group contact and publicity. Many of these activities will be carried out for the league by The Plumbing and Heating Industries' Bureau. In the market analysis, it is proposed to ascertain the actual number of home-owners, and their classification and location. It is further proposed to make home visitations to learn the condition of the radiator heating and plumbing equipment and the attitude of the owners toward the need for modernization. An estimate will then be made of the value of the potential market.

Some idea of the magnitude of the undertaking may be gained from the fact that there are 391,000 home owners in Philadelphia proper living in certain well-defined economic strata.

The part to be played by the Plumbing and Heating Development League includes a canvass of at least 10% of all homes in each of the zones by heating contractors, master plumbers and wholesalers' salesmen, with the object of procuring a list of live prospects. Heating contractors and master plumbers associated with the league will be expected to figure costs of actual installations in as many live prospects' homes as possible and submit such estimates to the prospects. They will also supply the plan manager with a list of special prospects for direct-mail advertising.

It is planned to carry 40,000 lines of newspaper advertising. The Plumbing and Heating Industries' enlarged program for 1928 will be used as a guide in so far as its provisions apply to the market-development plan.

How to Use the Baltimore Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right- or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Baltimore, Md.: 70 sq. ft. of 12-in. brick wall. Read down the column headed "Plain Brick 12-in."; the nearest corresponding figure in the table is 70.4. Following horizontally to extreme left or right shows 4 sq. ft. of 38-in. 3-col. radiation. If wall faces north, multiply by 1.4, making 5.6 sq. ft. actually required.

If the same wall has 30 sq. ft. of glass or door, the figure in the table under "Glass" is 30.7, or the equivalent of 6 sq. ft. This figure, multiplied by exposure factor 1.4, equals 8.4 sq. ft. If window has 39 lin. ft. of crack and is double hung wood sash, without weather strips, the corresponding figure in the table (using the column headed "50" under "Infiltration") falls between 37.5 and 43.8, or the equivalent of 6.5 sq. ft. of radiation. Multiplying by 1.4 for exposure equals 9.1 sq. ft. of radiation.

The three quantities—5.6, 8.4 and 9.1—equal 23.1, or, for simplicity, 23 sq. ft. as the total radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights unless skylights are vertical or practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

How to Use the Albany Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right- or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Albany, N. Y.: 70 sq. ft. of 12-in. brick wall . Reading down the column headed "Plain Brick 12-in.", the nearest corresponding figure in the table falls between 64.8 and 75.6. Following horizontally to extreme left or right shows 6.5 sq. ft. of 38-in. 3-col. radiation. If wall faces north, multiply by 1.1, making 7.15 sq. ft. actually required.

If the same wall has 30 sq. ft. of glass or door, the figure in the table under "Glass" is 31.5, or the equivalent of 10 sq. ft. This figure, multiplied by exposure factor 1.1, equals 11.0 sq. ft. If window has 39 lin. ft. of crack and is double hung wood sash, without weather strips, the corresponding figure in the table (using the column headed "50" under "Infiltration") is 38.5, or the equivalent of 10 sq. ft. of radiation. Multiplying by 1.1 for exposure equals 11.0 sq. ft. of radiation.

The three quantities—7.15, 11.0 and 11.0—equal 29.15, or, for simplicity, 29 sq. ft. as the total radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights unless skylights are vertical or practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS NATIO

STANDARD RADIATION ESTIMATING T

SHOWING RADIATION REQUIRED FOR QUANTITIES

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																		
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P.			Frame Std.
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	16"	
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	.60	.48	.41	.50	.40	.34	.24
225	44.0	52.0	18.0	36.0	72.0	144	16.8	12.8	10.4	15.2	11.6	10.0	10.8	9.20	8.40	12.0	10.4	8.80	24.0	19.2	16.4	20.0	16.0	13.6	9.60
1	5.11	4.33	12.5	6.25	3.13	1.56	13.4	17.6	21.6	14.8	19.4	22.5	20.9	24.5	26.8	18.8	21.6	25.6	9.38	11.7	13.7	11.3	14.1	16.6	23.4
2	10.2	8.66	25.0	12.5	6.26	3.12	26.8	35.2	43.2	29.6	38.8	45.0	41.8	49.0	53.6	37.6	43.2	51.2	18.8	23.4	27.4	22.6	28.2	33.2	46.8
3	15.3	13.0	37.5	18.8	9.39	4.68	40.2	52.8	64.8	44.4	58.2	67.5	62.7	73.5	80.4	56.4	64.8	76.8	28.1	35.1	41.1	33.9	42.3	49.8	70.2
4	20.4	17.3	50.0	25.0	12.5	6.24	53.6	70.4	86.4	59.2	77.6	90.0	83.6	98.0	107	75.2	86.4	102	37.5	46.8	54.8	45.2	56.4	66.4	93.6
5	25.6	21.7	62.5	31.3	15.7	7.80	67.0	88.0	108	74.0	97.0	113	105	123	134	94.0	108	128	46.9	58.5	68.5	56.5	70.5	83.0	117
6	30.7	26.0	75.0	37.5	18.8	9.36	80.4	106	130	88.8	116	135	125	147	161	113	130	154	56.3	70.2	82.2	67.8	84.6	99.6	140
7	35.8	30.3	87.5	43.8	21.9	10.9	93.8	123	151	104	136	158	146	172	188	132	151	179	65.7	81.9	95.9	79.1	98.7	116	164
8	40.9	34.6	100	50.0	25.0	12.5	107	141	173	118	155	180	167	196	214	150	173	205	75.0	93.6	110	90.4	113	133	187
9	46.0	39.0	113	56.3	28.2	14.0	121	158	194	133	175	203	188	221	241	169	194	230	84.4	105	123	102	127	149	211
10	51.1	43.3	125	62.5	31.3	15.6	134	176	216	148	194	225	209	245	268	188	216	256	93.8	117	137	113	141	166	234
11	56.2	47.6	138	68.8	34.4	17.2	147	194	238	163	213	248	230	270	295	207	238	282	103	129	151	124	155	183	257
12	61.3	52.0	150	75.0	37.6	18.7	161	211	259	178	233	270	251	294	322	226	259	307	113	140	164	136	169	199	281
13	66.4	56.3	163	81.3	40.7	20.3	174	229	281	192	252	293	272	319	348	244	281	333	122	152	178	147	183	216	304
14	71.5	60.6	175	87.5	43.8	21.8	188	246	302	207	271	315	293	343	375	263	302	358	131	164	192	158	197	232	328
15	76.7	65.0	188	93.8	47.0	23.4	201	264	324	222	291	338	314	368	402	282	324	384	141	176	206	170	212	249	351
16	81.8	69.3	200	100	50.0	25.0	214	282	346	237	310	360	334	392	429	301	346	410	150	187	219	181	226	266	374
17	86.9	73.6	213	106	53.2	26.5	228	299	367	252	330	383	355	417	456	320	367	435	159	199	233	192	240	282	398
18	92.0	77.9	225	113	56.3	28.1	241	317	389	266	349	405	376	441	482	338	389	461	169	211	247	203	254	299	421
19	97.1	82.3	238	119	59.5	29.6	255	334	410	281	369	428	397	466	509	357	410	486	178	222	260	215	268	315	445
20	102	86.6	250	125	62.6	31.2	268	352	432	296	388	450	418	490	536	376	432	512	188	234	274	226	282	332	468
21	107	90.9	263	131	65.7	32.8	281	370	454	311	407	473	439	515	563	395	454	538	197	246	288	237	296	349	491
22	112	95.3	275	138	68.9	34.0	295	387	475	326	427	495	460	539	590	414	475	563	206	257	301	249	310	365	515
23	118	99.6	288	144	72.0	35.9	308	405	497	340	446	518	481	564	616	432	497	589	216	269	315	260	324	382	538
24	123	104	300	150	75.0	37.4	322	422	518	355	466	540	502	588	643	451	518	614	225	281	329	271	338	398	562
25	128	108	313	156	78.3	39.0	335	440	540	370	485	563	523	613	670	470	540	640	235	293	343	283	353	415	585

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS NATIO

STANDARD RADIATION ESTIMATING T

SHOWING RADIATION REQUIRED FOR QUANTITIES

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																		
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P.			Frame Std.
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	16"	
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	.60	.48	.41	.50	.40	.34	.24
225	71.5	84.5	29.3	58.5	117	234	27.3	20.8	16.9	24.7	18.9	16.3	17.6	15.0	13.7	19.5	16.9	14.3	39.0	31.2	26.7	32.5	26.0	22.1	15.6
1	3.15	2.66	7.68	3.85	1.92	.96	8.25	10.8	13.3	9.12	11.9	13.8	12.8	15.0	16.4	11.5	13.3	15.7	5.77	7.21	8.43	6.93	8.65	10.2	14.4
2	6.30	5.32	15.4	7.70	3.84	1.92	16.5	21.6	26.6	18.2	23.8	27.6	25.6	30.0	32.8	23.0	26.6	31.4	11.5	14.4	16.9	13.9	17.3	20.4	28.8
3	9.45	7.98	23.0	11.6	5.76	2.88	24.8	32.4	39.9	27.4	35.7	41.4	38.4	45.0	49.2	34.5	39.9	47.1	17.3	21.6	25.3	20.8	26.0	30.6	43.2
4	12.6	10.6	30.7	15.4	7.68	3.84	33.0	43.2	53.2	36.5	47.6	55.2	51.2	60.0	65.6	46.0	53.2	62.8	23.1	28.8	33.7	27.7	34.6	40.8	57.6
5	15.8	13.3	38.4	19.3	9.60	4.80	41.3	54.0	66.5	45.6	59.5	69.0	64.0	75.0	82.0	57.5	66.5	78.5	28.9	36.1	42.2	34.7	43.3	51.0	72.0
6	18.9	16.0	46.1	23.1	11.5	5.76	49.5	64.8	79.8	54.7	71.4	82.8	76.8	90.0	98.4	69.0	79.8	94.2	34.6	43.3	50.6	41.6	51.9	61.2	86.4
7	22.1	18.6	53.8	27.0	13.4	6.72	57.8	75.6	93.1	63.8	83.3	96.6	89.6	105	115	80.5	93.1	110	40.4	50.5	59.0	48.5	60.6	71.4	101
8	25.2	21.3	61.4	30.8	15.4	7.68	66.0	86.4	106	73.0	95.2	110	102	120	131	92.0	106	126	46.2	57.7	67.4	55.4	69.2	81.6	115
9	28.4	23.9	69.1	34.7	17.3	8.64	74.3	97.2	120	82.1	107	124	115	135	148	104	120	141	51.9	64.9	75.9	62.4	77.9	91.8	130
10	31.5	26.6	76.8	38.5	19.2	9.60	82.5	108	133	91.2	119	138	128	150	164	115	133	157	57.7	72.1	84.3	69.3	86.5	102	144
11	34.7	29.3	84.5	42.4	21.1	10.6	90.8	119	146	100	131	152	141	165	180	127	146	173	63.5	79.3	92.7	76.2	95.2	112	158
12	37.8	31.9	92.2	46.2	23.0	11.5	99.0	130	160	109	143	166	154	180	197	138	160	188	69.2	86.5	101	83.2	104	122	173
13	41.0	34.6	99.8	50.1	25.0	12.5	107	140	173	119	155	179	166	195	213	150	173	204	75.0	93.7	110	90.1	112	133	187
14	44.1	37.2	108	54.0	26.9	13.4	116	151	186	128	167	193	179	210	230	161	186	220	80.8	101	118	97.0	121	143	202
15	47.3	39.9	115	57.8	28.8	14.4	124	162	200	137	179	207	192	225	246	173	200	236	86.6	108	126	104	130	153	216
16	50.4	42.6	123	61.6	30.7	15.4	132	173	213	146	190	221	205	240	262	184	213	251	92.3	115	135	111	138	163	230
17	53.6	45.2	131	65.5	32.6	16.3	140	184	226	155	202	235	218	255	279	196	226	267	98.1	123	143	118	147	173	245
18	56.7	47.9	138	69.3	34.6	17.3	149	194	239	164	214	248	230	270	295	207	239	283	104	130	152	125	156	184	259
19	59.9	50.5	146	73.2	36.5	18.2	157	205	253	173	226	262	243	285	312	219	253	298	110	137	160	132	164	194	274
20	63.0	53.2	154	77.0	38.4	19.2	165	216	266	182	238	276	256	300	328	230	266	314	115	144	169	139	173	204	288
21	66.2	55.9	161	80.9	40.3	20.2	173	227	279	192	250	290	269	315	344	242	279	330	121	151	177	146	182	214	302
22	69.3	58.5	169	84.7	42.2	21.1	182	238	293	201	262	304	282	330	361	253	293	345	127	159	185	152	190	224	317
23	72.5	61.2	177	88.6	44.2	22.1	190	248	306	210	274	317	294	345	377	265	306	361	133	166	194	159	199	235	331
24	75.6	63.8	184	92.4	46.1	23.0	198	259	319	219	286	331	307	360	394	276	319	377	138	173	202	166	208	245	346
25	78.8	66.5	192	96.3	48.0	24.0	206	270	333	228	298	345	320	375	410	288	333	393	144	180	211	173	216	255	360

TORS NATIONAL ASSOCIATION
ESTIMATING TABLE
FOR QUANTITIES INDICATED

ction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

BALTIMORE

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	$70°=T_1$	N	1.40	S	1.30
Base Temperature	$+30°=T_o$	NE	1.40	SW	1.30
Base Temp. +30° Equivalent to		E	1.30	W	1.40
Guarantee Temp. of +15° Outside		SE	1.00	NW	1.40

						ROOF				Base Floor		Interm'e Floor			Ceiling		Partition			Type
Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Conc. on Earth	Wood on Sleep.	4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Lath and Plas.	L & P Wo. Fl. Over	Stud L & P 1 Side	Stud L & P 2 Side		Kind
8"	12"	16"																		Thick.
.50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
20.0	16.0	13.6	9.60	12.4	14.0	12.0	24.0	16.0	12.0	6.20	2.60	4.00	3.00	4.00	9.80	5.60	12.0	6.60		K(Ti-To)
11.3	14.1	16.6	23.4	18.2	16.1	18.8	9.38	14.1	18.8	36.3	86.5	56.3	75.0	56.3	23.0	40.2	18.8	34.1		1
22.6	28.2	33.2	46.8	36.4	32.2	37.6	18.8	28.2	37.6	72.6	173	113	150	113	46.0	80.4	37.6	68.2		2
33.9	42.3	49.8	70.2	54.6	48.3	56.4	28.1	42.3	56.4	109	260	169	225	169	69.0	121	56.4	102		3
45.2	56.4	66.4	93.6	72.8	64.4	75.2	37.5	56.4	75.2	145	346	225	300	225	92.0	161	75.2	136		4
56.5	70.5	83.0	117	91.0	80.5	94.0	46.9	70.5	94.0	182	433	282	375	282	115	201	94.0	171		5
67.8	84.6	99.6	140	109	96.6	113	56.3	84.6	113	218	519	338	450	338	138	241	113	205		6
79.1	98.7	116	164	127	113	132	65.7	98.7	132	254	606	394	525	394	161	281	132	239		7
90.4	113	133	187	146	129	150	75.0	113	150	290	692	450	600	450	184	322	150	273		8
102	127	149	211	164	145	169	84.4	127	169	327	779	507	675	507	207	362	169	307		9
113	141	166	234	182	161	188	93.8	141	188	363	865	563	750	563	230	402	188	341		10
124	155	183	257	200	177	207	103	155	207	399	952	619	825	619	253	442	207	375		11
136	169	199	281	218	193	226	113	169	226	436	1038	676	900	676	276	482	226	409		12
147	183	216	304	237	209	244	122	183	244	472	1125	732	975	732	299	523	244	443		13
158	197	232	328	255	225	263	131	197	263	508	1211	788	1050	788	322	563	263	477		14
170	212	249	351	273	242	282	141	212	282	545	1298	845	1125	845	345	603	282	512		15
181	226	266	374	291	258	301	150	226	301	581	1384	901	1200	901	368	643	301	546		16
192	240	282	398	309	274	320	159	240	320	617	1471	957	1275	957	391	683	320	580		17
203	254	299	421	328	290	338	169	254	338	653	1557	1013	1350	1013	414	724	338	614		18
215	268	315	445	346	306	357	178	268	357	690	1644	1070	1425	1070	437	764	357	648		19
226	282	332	468	364	322	376	188	282	376	726	1730	1126	1500	1126	460	804	376	682		20
237	296	349	491	382	338	395	197	296	395	762	1817	1182	1575	1182	483	844	395	716		21
249	310	365	515	400	354	414	206	310	414	799	1903	1239	1650	1239	506	884	414	750		22
260	324	382	538	419	370	432	216	324	432	835	1990	1295	1725	1295	529	925	433	784		23
271	338	398	562	437	386	451	225	338	451	871	2076	1351	1800	1351	552	965	451	818		24
283	353	415	585	455	403	470	235	353	470	908	2163	1408	1875	1408	575	1005	470	853		25

←——These Items Figured on Basis of K $\left(\frac{T_i-T_o}{2}\right)$ ——→

TORS NATIONAL ASSOCIATION
ESTIMATING TABLE
FOR QUANTITIES INDICATED

ction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

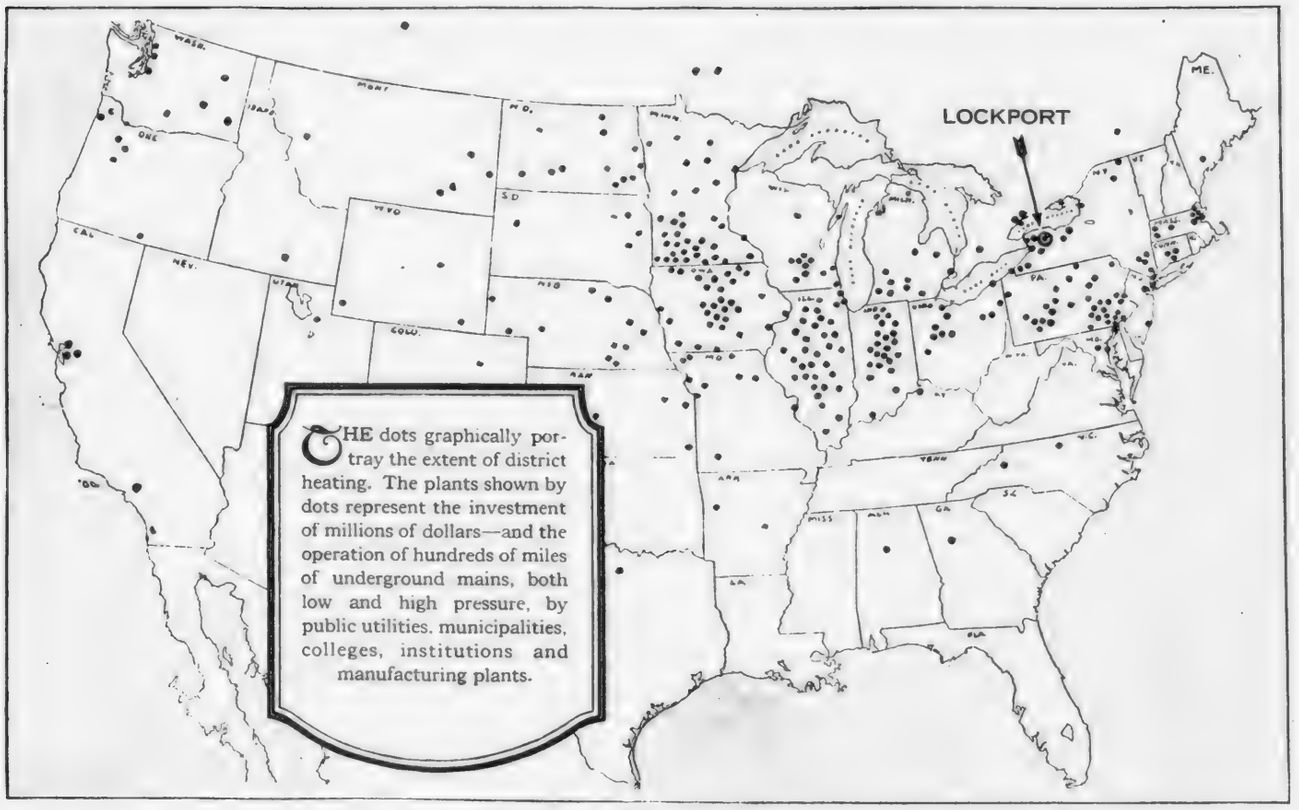
ALBANY, N. Y.

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	$70°=T_1$	N	1.10	S	1.00
Base Temperature	$+5°=T_o$	NE	1.10	SW	1.00
Base Temp. +5° Equivalent to		E	1.05	W	1.10
Guarantee Temp. of —10° Outside		SE	1.00	NW	1.10

						ROOF				Base Floor		Interm'e Floor			Ceiling		Partition			Type
Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Conc. on Earth	Wood on Sleep.	4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Lath and Plas.	L & P Wo. Fl. Over	Stud L & P 1 Side	Stud L & P 2 Side		Kind
8"	12"	16"																		Thick.
.50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
32.5	26.0	22.1	15.6	20.2	22.3	19.5	39.0	26.0	19.5	10.1	4.23	6.50	4.88	6.50	15.9	9.10	19.5	10.7		K(Ti-To)
6.93	8.65	10.2	14.4	11.1	10.1	11.5	5.77	8.65	11.5	22.3	53.2	34.6	46.1	34.6	14.2	24.7	11.5	21.1		1
13.9	17.3	20.4	28.8	22.2	20.2	23.0	11.5	17.3	23.0	44.6	106	69.2	92.2	69.2	28.4	49.4	23.0	42.2		2
20.8	26.0	30.6	43.2	33.3	30.3	34.5	17.3	26.0	34.5	66.9	160	104	138	104	42.6	74.1	34.5	63.3		3
27.7	34.6	40.8	57.6	44.4	40.4	46.0	23.1	34.6	46.0	89.2	213	138	184	138	56.8	98.8	46.0	84.4		4
34.7	43.3	51.0	72.0	55.5	50.5	57.5	28.9	43.3	57.5	112	266	173	231	173	71.0	134	57.5	106		5
41.6	51.9	61.2	86.4	66.6	60.6	69.0	34.6	51.9	69.0	134	319	208	277	208	85.2	148	69.0	127		6
48.5	60.6	71.4	101	77.7	70.7	80.5	40.4	60.6	80.5	156	372	242	323	242	99.4	173	80.5	148		7
55.4	69.2	81.6	115	88.8	80.8	92.0	46.2	69.2	92.0	178	426	277	369	277	114	198	92.0	169		8
62.4	77.9	91.8	130	99.9	90.9	104	51.9	77.9	104	201	479	311	415	311	128	222	104	190		9
69.3	86.5	102	144	111	101	115	57.7	86.5	115	223	532	346	461	346	142	247	115	211		10
76.2	95.2	112	158	122	111	127	63.5	95.2	127	245	585	381	507	381	156	272	127	232		11
83.2	104	122	173	133	121	138	69.2	104	138	268	638	415	553	415	170	296	138	253		12
90.1	112	133	187	144	131	150	75.0	112	150	290	692	450	599	450	185	321	150	274		13
97.0	121	143	202	155	141	161	80.8	121	161	312	745	484	645	484	199	346	161	295		14
104	130	153	216	167	152	173	86.6	130	173	335	798	519	692	519	213	371	173	317		15
111	138	163	230	178	162	184	92.3	138	184	357	851	554	738	554	227	395	184	338		16
118	147	173	245	189	172	196	98.1	147	196	379	904	588	784	588	241	420	196	359		17
125	156	184	259	200	182	207	104	156	207	401	958	623	830	623	256	469	207	380		18
132	164	194	274	211	192	219	110	164	219	424	1011	657	876	657	270	494	219	401		19
139	173	204	288	222	202	230	115	173	230	446	1064	692	922	692	284	519	230	422		20
146	182	214	302	233	212	242	121	182	242	468	1117	727	968	727	298	543	242	443		21
152	190	224	317	244	222	253	127	190	253	491	1170	761	1014	761	312	568	253	464		22
159	199	235	331	255	232	265	133	199	265	513	1224	796	1060	796	327	593	265	485		23
166	208	245	346	266	242	276	138	208	276	535	1277	830	1106	830	341	618	276	506		24
173	216	255	360	278	253	288	144	216	288	557	1330	865	1153	865	355	642	288	528		25

ta Sheets Nos. 13 I 3 and 13 J 3

←——These Items Figured on Basis of K $\left(\frac{T_i-T_o}{2}\right)$ ——→


LOCKPORT
THE dots graphically portray the extent of district heating. The plants shown by dots represent the investment of millions of dollars—and the operation of hundreds of miles of underground mains, both low and high pressure, by public utilities, municipalities, colleges, institutions and manufacturing plants.

The Spread of District Heating

Glancing Backward

High Lights in the Evolution of Leaders in the Heating and Ventilating Industry

V—American District Steam Company

FREQUENTLY the transition from the impossible scheme to a workable plan, affording service to mankind, forms a fascinating story of obstacles overcome by ingenuity and the exercise of sheer will-power. Such a tale can be told of the beginning and growth of a company, now a recognized leader in that high-specialized field known as "district heating."

Back in the early 'sixties Birdsill Holly, who had invented a steam fire engine and a rotary pump, moved his machine manufacturing business from Seneca Falls, N. Y., to Lockport, where he organized the Holly Manufacturing Company for the manufacture of sewing machines, flat irons, sinks, and many other articles of iron and brass. Later the company took up the manufacture of cistern pumps of all kinds and began building rotary pumps on a large scale. This necessitated larger and more modern shops.

Here Mr. Holly developed the system, now in universal use by water works, of pumping water under pressure into mains laid underground. The demand for this system became so great that shops for the manufacture of pumping machinery had to be more than doubled.

Birdsill Holly
The father of district heating

So far, all of Mr. Holly's inventions had met with instant success. However, when he advocated the heating of buildings by steam from pipes laid underground, this newest idea was greeted with much criticism and pronounced by leading engineers, mechanics and trade papers as "foolish, visionary and totally impractical." Failing to obtain either financial or moral support, Mr. Holly made experiments at his own expense to demonstrate his theory. He improvised a small boiler in the basement of his home on Chestnut Street and laid a continuous 700-ft. line of 1½-in. pipe around his back yard and in the adjoining property. The pipe was covered with layers of asbestos, felt, building paper and, finally, manila paper, secured with twine. As no wood casing could be obtained, 2 in. x 10 in. planks were used to make a wooden conduit. The trench was deep enough to provide a coverage of 3½ ft.

When steam was turned on, the installation worked even better than expected. Mr. Holly then had his residence fitted up with crude pipe coils. Steam was first taken to the attic, into what he called a "distributor." From here supply pipes took it to coils in the various rooms. A loop in the basement

served as a trap and returned the condensate to the boiler. In spite of this demonstration the critics refused to believe that steam would be carried successfully for any considerable distance.

Having given up the active management of the manufacturing company, Mr. Holly tried to interest capital to develop his district-heating scheme. After much discouragement he finally secured some financial help from men who, though without mechanical training, had imagination and foresight. It was some time before anyone with mechanical ability considered the underground distribution of steam as anything but a foolish experiment.

ACTIVE OPERATIONS BEGUN IN 1877

In the spring of 1877, fifty-one years ago, Mr. Holly and his backers organized the Holly Steam Combination Company, Limited, with a capital of $25,000. Their plan was to heat a section of Lockport. The town authorities granted the new company a franchise to open the streets for the laying of steam pipes.

The company built a small boiler house and coil shed and a chimney 30 in. square by 30 ft. high. The station was equipped with a second-hand upright boiler about 7 ft. in diameter and 10 ft. high with drop tubes. Drawings made by Mr. Holly on scraps of paper were used for making the expansion joints and other fittings. Bored-out wooden water pipe was used for the insulation and conduit covering the iron pipes. Guesses were made as to the proper size pipes to lay. The pipe sizes selected ranged from 4 in. down to 2 in. The first season saw 2350 ft. of mains laid, connecting with the principal residences, churches, hotels and other buildings in the district. The service lines were ¾-in. or 1-in. pipe. With the mains in and connections made, the stage was set.

There was considerable excitement in Lockport, the day steam was turned on. One of Mr. Holly's young sons turned a valve and the mains were quickly filled with steam at 30 lbs. pressure. In less than an hour the coils in every building were hot. The first chapter in district heating history had been written. The system was pronounced a success. Steam gauges in the buildings heated by the new system showed a loss in pressure of only 2 or 3 lbs. This was a revelation to the skeptical.

SOME OF THE EARLY DIFFICULTIES

Everything ran smoothly for a few days; then trouble began. Foreign matter in the canal, such as small fish, lizards, eelgrass and paper stopped the boiler-feed pumps. Screens were placed before the pumps, but even these permitted much of the finer matter to find its way into the drop tubes of the boiler, and as they were solid on the ends over the fire, they could not be cleaned. The accumulated matter baked in, causing the tubes to burn off and put out the fires. This caused a number of embarrassing shut-downs for repairs during the first winter. However, none of the buildings on the line had abandoned its stoves or furnaces and so was not greatly inconvenienced.

The company finally struggled through the winter at a financial loss. Mr. Holly and his associates were even more enthusiastic and backed their confidence with cash and courage. During the summer more capital was secured. The company extended its mains 2500 ft. Another boiler, made by the Holly Manufacturing Company, was installed. The same summer the company also added to its prestige and revenue by installing plants at Auburn, N. Y., Garden City, Long Island, and at the Soldiers' Home in Dayton, O.

Very little trouble was experienced the second winter. The upright boiler in the station was equipped with new tubes but was used only when cleaning the horizontal boiler. Several extensions were made the following spring. The winter had been a good one—encouraging and profitable.

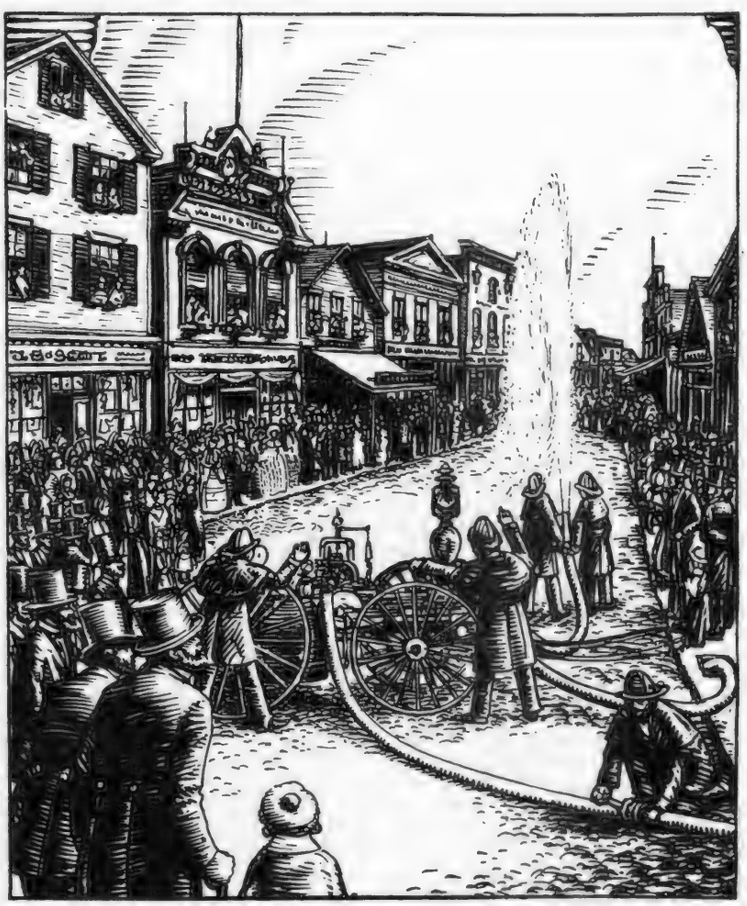
HOW THE DISTRICT HEATING IDEA SPREAD TO OTHER CITIES

News of this radical departure in heating began to spread. Committees from other cities came to Lockport to investigate district heating. New York capitalists sent Charles G. Emery, a noted engineer, to make experiments and tests. His report to his principals resulted in the installation of what is to-day the largest plant in the world for the distribution of steam for power and heating purposes.

Up to this time very little was thought of heating by exhaust steam, but in the winter of 1880, the company contracted with capitalists in an Eastern city for a large installation of this kind using both high and low pressure. Two 8-in. lines were laid in one trench. One line supplied power at 80 lbs. steam pressure to a large number of factories whose engines exhausted into the other line which heated several buildings. Since then exhaust steam has become an important factor in district heating.

ORGANIZATION OF AMERICAN DISTRICT STEAM COMPANY

On January 19, 1881, the Holly Steam Combination Company, Limited, was reorganized to take care of a rapidly-growing industry and utility. The name was changed to the American District Steam Company. The officers and trustees of the company (among whom were the original backers) were: President, David F. Bishop, M.D.; vice-president, Ransom Scott, shirt manufacturer, Lockport; treasurer, Isaac H. Babcock, connected with the Farmers & Mechanics Savings Bank, Lockport; secretary,



Taking Steam from Street Mains in Lockport, New York, 1879, When Testing a "Modern" Fire Engine

Barnett D. Hall, dry goods merchant, Lockport; Birdsill Holly, consulting engineer, and E. P. Holly, chief engineer. The new company was capitalized at $10,000,000.

At the time of its reorganization the company was installing a number of plants, both in Pennsylvania and in the West, the profits from which were used to buy more boilers for the Lockport plant. The company decided, however, not to extend its lines until those already laid were better loaded. This was a wise move because that winter proved that many of the pipes were entirely too small. It was necessary to enlarge several of the mains and to build a larger stack at the station on Elm Street.

As the success of the Lockport heating plant was discussed by city officials and utility executives elsewhere, the new company received many inquiries which developed into installation contracts. A partial list of some of the steam heating and power companies which went into the heating business under the Holly patents during the first ten years of the company's existence, from 1877 to 1887, includes:

Lockport, N. Y.; Auburn, N. Y.; Springfield, Mass.; Dubuque, Ia.; Burlington, Ia.; Garden City, L. I.; New Haven, Conn.; Belleville, Ill.; Denver, Colo.; New York, N. Y.; Williamsport, Pa.; Clearfield, Pa.; Bellefonte, Pa.; Phillipsburg, Pa.; Lock Haven, Pa.; Bloomsburg, Pa.; Wilkes-Barre, Pa.; Reading, Pa.; Harrisburg, Pa.; Hazleton, Pa.

These represented an aggregate investment of several million dollars in plant and equipment.

The size of the installations ranged from 1½ to 16 miles of underground pipe.

STEAM FIRST SOLD AT A FLAT RATE

For several years steam was sold at a flat rate. Mr. Holly realized the folly of this procedure and solved the problem by designing a meter. The meter showed that many customers were using twice as much steam as they required for satisfactory service. The installation of meters greatly decreased waste and for some time it was possible to dispense with the use of one boiler at the Lockport plant. Other improvements were also made, one of which was a variator which took the place of the junction box. The variator, being a closed or packless expansion joint, eliminated the need for many man-holes in the streets.

HOW COMPANY CAME TO MANUFACTURE ITS OWN SPECIALTIES

The manufacture of traps, regulators, meters, and other equipment required by the company, kept many of the Lockport machine shops busy. They regarded the Holly Steam Combination Company, Limited, as a "good thing," and charged such prices that the company, which had confined its activities to the sale of steam in Lockport, and the installation of district heating plants in various parts of the country, decided to operate shops of their own for the manufacture of their devices.

The first shop was located in two rented rooms over a store on Main St. The equipment, which consisted of a few crude tools and a one-man pattern shop, enabled the company to make its own patterns and manufacture its own traps, regulators and meters, but not the larger devices, which were still built by other local shops. The payroll started with five men.

As more contracts for underground work came in and the demand for heat in Lockport increased, the company built new coal sheds at the heating station on Elm Street and converted the old ones into a two-story shop. Here it was able, for the time being, to manufacture all of its products. The building had no elevators. Everything was hoisted by block and tackle through a trap door. The shop, as well as the boiler house, was illuminated at night by kerosene "boat lamps."

In the early days, Mr. Holly had designed a sheet-metal atmospheric steam radiator to take the place of the crude and unsightly coil box. For the next few years many of these were sold to those using district heat. Mr. Holly now brought out the iron-pipe atmospheric radiator. Hundreds of these were made and sold to district heating plants throughout the country. Shortly after, the Walworth Company brought out an iron-pipe radiator and the Reed Company brought out the first cast-iron radiators. Steam heating was growing in popularity.

POPULARITY OF DISTRICT HEATING REFLECTED IN GROWTH OF COMPANY

The company outgrew its second shop in a few years. A larger and more modern four-story building was erected across Elm Street and equipped with modern tools throughout. In a short time this also proved too small. An addition was built, in which provision was made for the company's first drafting room and engineering department.

Up until this time all castings were made by Lockport foundries and at a considerable cost to the company. The volume was constantly swelling and the economy of a company foundry became apparent. It was decided to build modern foundries at North Tonawanda, N. Y. This justified itself, for soon they were producing their own castings for about one-half the previous cost. As a result of all of these improvements and the continuing good business, a reserve was established, dividends declared and later the company was able to build the present large and modern shops at North Tonawanda, N. Y.

Mr. Holly did not live to see the full realization of his early efforts in central station heating. After giving to the world his many valuable inventions, he died in 1894, a comparatively poor man.

During the years that intervened between 1880 and the building of the present plant in North Tonawanda, N. Y., many changes were made in the board of trustees and officers of the company. Wallace C. Andrews, then also president of the New York Steam Company, became president of the American District Steam Company. After his death in 1899, G. C. St. John, who had married his sister, succeeded Mr. Andrews as president of the New York Steam Company, the American District Steam Company, and as an officer and director of many other companies in which Mr. Andrews had been interested. Mr. St. John remained president of the New York Steam Company until 1920, and still continues as president of the American District Steam Company.

The active management of the American District Steam Company, is under Robert Hall, vice-president and general manager. Mr. Hall, who is a son of the late Barnett D. Hall, one of the original promoters and the first secretary of the old company, became interested in district heating at an early age. In 1894, David F. Bishop, then president of the company, sent young Mr. Hall to Scranton to assist with some underground construction work and asked him to make any suggestions he could for improvements. Out of various recommendations made, many are in use to-day.

In the fall of 1895, Mr. Hall decided on a college career and for the next two and one-half years attended Union College, working during the summer months in the General Electric Company's shops in Schenectady. He then entered the employ of the company, starting in on field and construction work, in which his engineering training proved invaluable. Having a keen engineering mind and a penchant for improving things, he rose rapidly through the ranks, occupying positions in every department. This broad experience fitted him admirably for his present position of vice-president and general manager.

ORGANIZATION OF SUBSIDIARY INSTALLATION COMPANIES

In order to more advantageously handle construction work and piping installations, the American District Steam Company, in the summer of 1925, incorporated in New York State the Northeastern Piping & Construction Corporation. During the same year its other subsidiary, the Canadian District Steam Company, Limited, was organized under Dominion charter to take care of district heating installations anywhere in Canada. Branch offices and agencies are maintained in all of the principal cities of both countries. At the head office in North Tonawanda there has recently been established an engineers' service department which is doing a large amount of helpful work by placing before engineers the experience of half a century through suggestions, criticisms and recommendations, freely given on any problems submitted having to do with steam or hot water distribution.

Correspondence

Arc Welding Prevents Corrosion

EDITOR HEATING AND VENTILATING MAGAZINE:

I was greatly interested to read the article "Welding for Heating Plants" in the March issue, and took particular note of the statement that "Results of corrosion are as yet unknown."

I believe that it might be interesting for your readers to get further information on this point, and, with this thought, I submit the following:

In 1918, the United States Navy applied a welded portion to the hulls of ships for the express purpose of noting corrosion. After ten years no corrosion has occurred at the weld or near the weld. It was thought that electrolitical action between deposited and original metal might take place, especially in salt water or combination of salt and fresh water. This has been found not to be so by the United States Navy and the Bureau of Standards.

Again, the New York Central Railroad, in 1917-18, welded transmission poles along the Hudson River. Official examination made this year shows that no corrosion or any deterioration of any kind has taken place in ten years. These poles are on the bank of the river that is alternately fresh and salt water. Spray blown on the poles had eaten them away as originally built, but when padded over with welding, corrosion was stopped. So much for water, and water and air.

As for pipe welding, we have an example in the Grand Central Palace and the Grand Central Terminal, nearly ten years old, which has shown no corrosion whatever on the piping, water—air—steam—and conduit, having been arc welded in the 50th Street power house and centering in and through the Grand Central Terminal and Grand Central Palace, and no corrosion or leaks have occurred since the job was made tight. From these examples, it would appear that welding has the opposite effect of corrosion; it arrests corrosion.

Lately there have been developed stainless steel and rustless iron electrodes which absolutely prohibit corrosion. Not only corrosion, but effects of scaling from heat and differences in temperature can be corrected by these new electrodes, and the welding art very fortunately has progressed to the point where not only steel, but malleable, wrought-iron and cast-iron can be coated or padded over with these rustless alloys. Also, we must not forget Monel metal and the older nickel alloys which can be used to render iron and steel impervious to corrosion.

I am writing this letter to point out that, while corrosion may worry a great many people new in the art, as a matter of fact, welding has been the savior of corrosion for years past and has a wonderful record of having caused no deterioration.

Newark, N. J. C. J. H.

Electric Welding School

A school for the training of electric arc welders has been established by the Lincoln Electric Co., Cleveland, O. The course extends for a period of 30 days,

Line of Motor Generators and Welding Booths in Lincoln Electric Company's Training School

during which time 12 lessons are given. There is no tuition or fees. The equipment consists of a number of standard 200 ampere "stable arc" welders installed in front of a line of booths, each constituting an individual workshop. The pupils work under the direction of a trained instructor who teaches them both as a class and as individuals. It is stated that in the 30 days of intensive training, men without previous knowledge of the art are able to acquire a sound working knowledge of the fundamentals of electric arc welding and are fitted to engage competently in the trade.

Student Practicing Electric Welding

Heating and Plumbing Industries Institute at Carnegie Tech

The fourth annual three-day Institute for the Heating and Plumbing Industries under the auspices of the Carnegie Institute of Technology in Pittsburgh, was held on Wednesday, Thursday and Friday, March 21, 22 and 23. As in former years, the meetings were under the direction of the department of industrial relations and the department of heating, plumbing and ventilating.

In this year's program special emphasis was paid to the business aspects of the problems facing members of the heating and plumbing industries. Special lectures by members of the Carnegie faculty were given on subjects relating to accounting, selling, and advertising. Considerable discussion was provoked on such topics as co-operative advertising as a means of meeting competition with other industries.

The Three-Day Institute, which was inaugurated by Doctor Connelley and Prof. Samuel E. Dibble, as a method of helping master plumbers and heating and ventilating contractors to solve their own special problems, has become one of the outstanding features of the calender at Carnegie. Since the first institute was held four years ago, similar conferences have been held, or are planned, at the University of Illinois, Massachusetts Institute of Technology, and other large institutions.

The faculty for the institute was composed of Dr. Walter F. Rittman, professor and head of the department of commercial engineering, and William T. Crandell, assistant professor of commercial engineering, who discussed accounting and selling problems; Samuel E. Dibble, who is the Theodore Ahrens professor of plumbing, heating and ventilating; Harry S. Hower, professor and head of the department of physics, and A. H. Blaisdell, assistant professor of mechanical engineering, who analyzed technical problems with special emphasis on the subject of "transmission of heat from various fuels into water."

CONDENSED CATALOGS OF MECHANICAL EQUIPMENT 1927-1928 has been issued by the American Society of Mechanical Engineers, New York. This volume contains also a general classified directory of manufacturers in the mechanical field and a professional engineering service directory, made up from the membership of the A.S.M.E. Price to nonmembers $5 per copy. Size 9 in. x 11½ in. Pp. 990.

Domestic Oil Burners of To-day

Stabilized Design and the Presentation of Junior Sizes the Outstanding Features of the 1928 Season

THE burners described on these pages, together with those featured in the preceding article, under the same title, in the March issue, constitute the more important burners boasting of national distribution.

Super Oil Heator

The Super Oil Heator is manufactured by the Super Oil Heator Co., Hartford, Conn. It is built in one size and is designed to be installed entirely within the ash-pit space of the boiler or furnace, a molded bottom being forced for the combustion chamber when the burner is installed. Oil is fed to a fixed-level sump below the motor, which is vertically mounted and has a hollow shaft. Oil is drawn through this hollow shaft and sent to a rotating nozzle with an annular opening, at the upper end of the shaft. Raffle plates and air rings are provided to control the flow of air, both as to quantity and location. Oil is thrown from the spinning nozzle and combustion is completed within the confines of the molded hearth. Ignition is established through the use of a gas pilot so located that it cannot be blown out. The Super Oil Heator is designed to operate on 28°-32° A.P.I. oil, or lighter.

Nu-Way

Nu-Way automatic oil burners are manufactured in nine sizes by the Nu-Way Corp., Rock Island, Ill. The smallest burner is easily adapted for heating water for a home requiring a dependable supply of hot water automatically and maintained at the desired temperature. The nine burners are very similar and the construction is almost identical except in size. Six sizes employ low-pressure atomization and three are of the pressure-atomizing type. The former consist of an electric motor direct driving a blower and an emulsifying pump, all carried on oil-immersed bearings. The same base carries the control equipment and the fuel regulating device. The oil is brought to the burner by gravity, either supplied from an inside storage tank or an automatic pump unit separate from the burner.

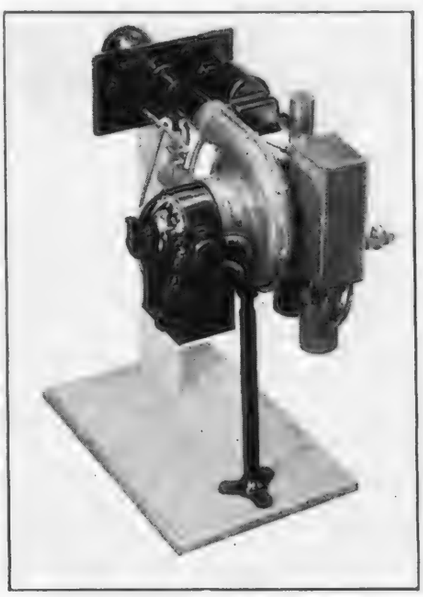
The means of regulating the fire and the amount of fuel is a constant-level device and fuel regulating valve. A definite amount of oil is picked up by the emulsifying pump, mixed with air and delivered to the atomizer nozzle. The nozzle is so constructed that the oil is broken up into fine particles and distributed through the air stream. Air for combustion is delivered by a Sirocco-type blower, through an air spiral around the nozzle tip. Ignition is electric-gas or straight electric. These six burners will handle from 200 sq. ft. of steam radiation to 8000 sq. ft.

In the three sizes of pressure-atomizing burners, the oil is broken up in a nozzle under higher pressure than is used in the low-pressure burners. Air is supplied in the same manner and ignition is the same.

Rayfield

The Rayfield oil burner is built by the Rayfield Mfg. Co., Chicago, makers of Rayfield carburetors.

It is manufactured in seven sizes, the junior model having a capacity up to 700 sq. ft. of steam boiler rating and the Nos. 1 to 4, rated to carry from 1200 sq. ft. to 15,000 sq. ft. of steam boiler rating. The burner is of the atomizing type, the nozzle being located just inside of the fire-door, carried on a special plate. A cone of atomized oil is directed downward at a bed of crushed fire brick laid on the grate, which becomes incandescent and is an important factor in producing gasification. Electric ignition with a flaming spark is used, the spark being blown into the jet of atomized oil. The Rayfield mercury tube relay, boiler control and thermostat are used. Rayfield burners are listed by the Underwriters' Laboratories.



Rayfield

Summerheat

The Summerheat Burner is manufactured by the Summerheat Corporation of America, Dowagiac, Mich. It is built in three sizes.

Types P and S constitute the "old line" oil heat burners, the last number of the trio being known as the Summerheat Ideal. The last named incorporates practically all of the essential features of the earlier types, and like these it is installed to swing on the fire door of the boiler or furnace. This arrangement permits a quick change to solid fuel should it become necessary, and also allows the heating plant to be used as an incinerator, garbage being burned directly on the grate. All Summerheat burners use electric ignition.

Northern

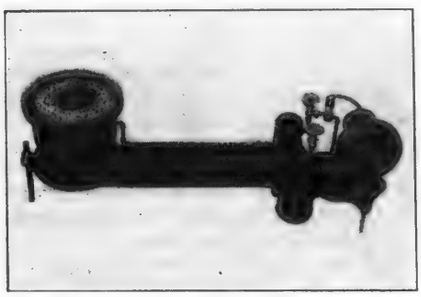
The Northern oil burner is manufactured by the Northern Machinery Co., Minneapolis, Minn. It is unique among natural-draft burners in that it operates with a gas pilot and in that means are provided for the regulation, within a fairly close margin, of the amount of air passing through the burner.

Oil is fed to the burner by gravity through an equalizing valve on an elevated tank located in the basement. The oil enters the needle valve through a strainer and from it passes through a diaphragm valve operated by the thermostat motor. Oil actually enters the combustion pot through a ¼-in. pipe which is centered in the air sleeve or blast pipe. This delivers the oil at a point just under a small Bunsen-type gas pilot, which creates a hot spot in the bottom of the combustion pot. The oil is thus vaporized and the flame slowly builds up as the draft increases to its regular flow. The fire-pot is, in reality, double. The outer pot is solid and the inner pot has a slightly concave bottom, where the oil is vaporized and has perforated sides. The air, pulled through the air sleeve from the basement, enters the pot through these many openings. The flame reaches its normal operating size within about a minute from starting. Because of the fact that natural draft is used there is no violent rush of air through the burner and no rapid expansion of gases upon ignition. This allows the use of a small gas flame for a pilot. Draft is controlled by a balanced damper cut into the smoke-pipe between the boiler and the chimney.

This burner is designed for use in the average small home and to handle from 350 to 450 sq. ft. of steam radiation. It is especially adapted to warm-air heating because of the elimination of motor noise. It is designed to burn oil not heavier than 38° A.P.I.

Laco

The Laco burner is manufactured by the Laco Gas Burner Co., Griswold, Ia. It is made in five sizes and is designed to handle any type or size of domestic heating plant. This burner is unique in that it gasifies the oil by feeding it to the bottom of a combustion pot which is almost entirely filled with broken-up fire clay that acts substantially as a wick. A blower provides air for combustion, forcing it up through a stand pipe in the axis of the combustion chamber. The largest burners are designed to provide heat for a 10,000 sq. ft. steam boiler.



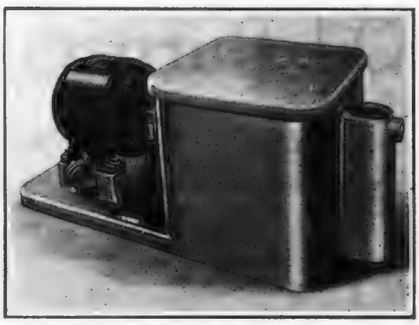
Laco

Torridheet

The Torridheet burner is the product of the Torridheet Oil Burner Division of the Cleveland Steel Products Corp., Cleveland. This burner is built in one size for use in homes of average size, and consists of a vertically-mounted motor driving an atomizing nozzle, the entire assembly being located in the ash-pit of the boiler. The control unit with necessary adjustments is set outside of the boiler, with flexible connections between. The oil is forced through the hollow shaft of the motor by a spiral impeller. Centrifugal force throws the fuel outward from four horizontal pipes or ducts leading from the hollow shaft. The oil strikes the blades of a rapidly revolving fan at the top of the shaft, combustion taking place in an annular ring, wiping the walls of the boiler. A hearth is troweled in on a sheet-iron base placed at the grate level. Ignition is by an expanded gas flame.

Ballard

The Ballard Junior Model "C" oil burner, manufactured by Arthur H. Ballard, Inc., 463 Commercial St., Boston, is designed for installation in any kind of heating plant and is built in four sizes, rated to handle respectively, 1000, 2500, 5000 and 10,000 sq. ft. of radiation.



Ballard Junior

The burner atomizes oil under low oil pressure and is designed to use oil from 28° A.P.I. to 41° A.P.I.

Oil is drawn by a small suction pump from the tank and enters the burner through a strainer on its way to the suction port of the pump. From the discharge port the oil is forced into the regulating float valve, which allows sufficient oil to flow to the burner reservoir to maintain, at all times, a constant level. The atomizing pump draws oil from this reservoir and emulsifies it through a churning action, delivering the frothy mixture to the burner orifice. At this point atomization is effected and the resultant spray is ignited, combining with secondary air from the air port underneath the combustion floor. The shape of the flame can be changed to suit the combustion chamber by using different orifices. A Mercoid stack safety control is used, inter-connected with a boiler, steam or water control.

McIlvaine

In describing the McIlvaine burner in the previous article in this series, it inadvertently was stated that it operated on the "high-low" basis. This was incorrect, as operation is graduated between high and low limits, the rate of combustion being proportional to the demand for heat.

Additional Exhibitors at the American Oil Burner Convention

In addition to the list published in last month's issue of the exhibitors at the recent oil burner show in Chicago, the following also had displays:

American Oil Burner Association and Oil Heating Institute, New York.
C. E. Bird and Co., Minneapolis, Minn.
Chicago-Jefferson Fuse and Electric Co., Chicago, Ill.
Combination Boiler Co., Benton Harbor, Mich.
Eisler Engineering Co., Newark, N. J.
Fluid Heat Corp., Baltimore, Md.
The Lassen Equipment Corp., Hartford, Conn.
F. I. Raymond, Forest River, Ill.
Tabor Mfg. Co., Philadelphia, Pa.
Viking Pump Co., Cedar Falls, Iowa.
Wagner Electric Corp., St. Louis, Mo.
Winslow Boiler & Engineering Co., Chicago, Ill.

What is the Oil Reserve?

How little is definitely known, and how few accurate data are available in regard to the reserves of crude oil was evidenced at a recent meeting of the American Institute of Mining and Metallurgical Engineers, when a series of discussions followed a paper presented by C. P. Watson, president of the Federal Royalties Co., Fort Worth, Texas, on "Economic Significance of Oil Developments of West Texas," in which he set forth estimates of future production from exploited territory. Mr. Watson gave the aggregate as 715,000,000 bbls. from four principal and a number of smaller fields.

In the discussion, an eminent geologist, stated that Mr. Watson's estimate of 325,000,000 bbls. from the Yates fields was too large by at least 100,000,000 bbls. Where experts differ so widely in regard to reserves in definite areas, it is not to be expected that any really accurate survey of national oil wealth can be expected.

Another expert illustrated how little is known about what is underground by stating that the first test drilled in the Hendricks pool came within one location of missing the field entirely—a field that is estimated to contain 120,000,000 bbls. of oil. This last figure is in doubt as a great deal of exploratory drilling would have to be done before it could be said that definite parts of this great territory were or were not oil-bearing. This meeting was particularly interesting because it clearly brought out how little dependence can be placed upon any individual or group statement by experts on this subject.

Chicago Heating Contractor Tells of Oil-Burning Experiences

A feature of the February meeting of the Chicago Oil Burner Association was the talk of W. E. Graves, a pioneer master steam-fitter in the city of Chicago. His subject was "One Heating Contractor's Experience with Oil Heating."

Mr. Graves sketched his personal experience in his own home with three different burners, and highly commended this form of heating service when the burner is properly installed and regulated. He raised the point that the majority of dealers made the mistake of adjusting burners to provide too much heat and to generate heat at too high a rate. He also expressed the opinion that frequently the aquastat was set too high.

Exhibiting several temperature-recording charts, made in his home, an in-

sulated brick house, Mr. Graves stated that such a house could be heated very economically with oil, and that, due to the insulation, rapid decrease in outdoor temperature was not made manifest in the house for several hours. For this reason he said the oil burner operated at less frequent intervals than it would in an uninsulated home.

At the conclusion of his talk, there was a general discussion of the value of using a temperature control operated by a thermostatic element outside of the building, and taking cognizance of the changes in outdoor temperature.

Lyle Straight, president of the association, named a convention arrangement committee in connection with the American Oil Burner Association Convention at the Stevens Hotel, April 3-5. This committee consists of J. W. Owens, chairman; C. W. Presdee, vice-chairman; R. D. Barnes, C. H. Cress, D. M. Durkee, C. H. Foulds, J. F. Jaasp, J. I. Janette, Jr., J. M. Knox, T. C. Kyle, H. R. Linn, J. L. L. McCormick, E. W. Miles, T. L. Owens, G. Puhl, H. E. Risher, Lyle Straight.

Francis L. Boutell, commissioner of Cook County, Illinois, was a guest of the association, and spoke on the subject of operations of the various county institutions.

Three new companies were elected to membership in the association.

Oil-O-Matic Regional Sales-and-Service Schools Cover Country

Gathering together into groups those interested in the development of Oil-O-Matic sales, installation and service, nearly 20 regional schools were held during January and February, the aggregate attendance being well in excess of 1000. Schools were held in Minneapolis, Omaha, Indianapolis, Lansing, Mich., Ottawa, Ont., Pittsburgh, Boston, Rochester, New York, N. Y., Philadelphia, Richmond, Charlotte, N. C., Atlanta, Memphis, St. Louis and Kansas City.

The largest school was held in Boston where 180 attended. It is stated that these are the largest sectional gatherings that have rewarded the efforts of the Oil-O-Matic organization to properly instruct sales, installation and service men.

A Warning to Oil-Burner Dealers

Under the caption, "Oil Burners Cannot Cure Sick Heating Systems," J. W. Stark, of Torridheat Oil Burner Division of Cleveland Steel Products Corporation, sounds a warning to oil-burner dealers and distributors in the latest issue of *Mercoids*, the house organ of the Federal Gauge Company. Mr. Stark briefly outlines some of the symptoms of a sick heating system and some of the causes of a faulty system. He says, "No matter how good an oil burner may be, or how well it is installed, it will not cure a sick heating system! Proper and economical heat can be obtained only when the heating system itself is correct. . . . To reach the desired goal we must not attempt to cure sick heating systems by installing oil burners. Existing faults in the system itself must first be corrected. Doubtless, at the outset we all may lose a sale or two, but the loss will be only temporary. For we shall have established confidence for our own burners in the minds of our prospects; and our action will contribute largely towards the permanent stabilization of the industry."

A. S. M. E. Research Committee to Study Combustion in Domestic Furnaces

Following the authorization, in October, 1927, of a special Research Committee on Fuels by the American Society of Mechanical Engineers, this committee has had its organization meeting, elected permanent officers and developed working plans. The committee was appointed to collect existing data on fuels research, to co-ordinate present research efforts where possible and advisable and to carry on research on specific problems in this field. The chairman of the committee is F. R. Wadleigh, consulting engineer; vice-chairman, A. C. Fieldner, chief engineer, U. S. Bureau of Mines; secretary, Vincent G. Shinkle, consulting petroleum engineer.

Preliminary to organizing actual research work, the committee, at its first meeting, recognizing the necessity for and value of attaining a definite knowledge regarding research work now being carried on, decided to assign to each member the work of securing the desired information regarding his particular field as included in the broad, general subject for research determined upon.

Eleven sub-divisions were made, No. 6 being designated as "Combustion in Domestic Furnaces (all fuels)." J. H. McNally, fuel engineer, Pardee Brothers & Company, Inc., and F. R. Wadleigh are in charge of this phase of the endeavor. After the available data have been secured and outlined, the committee proposes to decide upon the actual research activities to be inaugurated, with plans for carrying them on and securing the necessary personnel, funds and facilities.

Simplified Data Sheets for Warm-Air Heating

Published by the Midland Furnace Club, a series of data sheets prepared by L. W. Millis for the Warm-Air Study Club of the Security Stove & Manufacturing Company, Kansas City, Mo., has been brought together in bulletin form. These data sheets were designed to present, step-by-step, the measurement of heat, the determination of heat loss of buildings, the essentials of the standard code approved by the National Warm Air Heating and Ventilating Association, together with a great deal of valuable data on the subject of warm-air furnace installation. These subjects are all handled in the parlance of the trade and are exceedingly easy to read and to understand. This excellent little publication of 32 pages is a real help in raising the standards of installation and in bringing work into line with the standard code.

Interpreting Committee Appointed for Chicago's Furnace Code

In connection with the Chicago warm-air furnace code which, as reported in last month's issue, has recently been adopted by that city, a committee has been appointed by Christian P. Paschen, building commissioner of Chicago, to work with him and the inspection force in interpreting the code. This committee will function as an advisory body upon technical problems encountered by inspectors in the enforcement of the code ordinance, and will be headed by L. M. Burt, president of the Greater Chicago Warm-Air Heating Association.

Minneapolis Regional Oil-O-Matic School

National Home-Building Council to Promote Rehabilitation Movement

LAUNCHED by representatives of some 31 important interests in and allied with the building industry, a national co-operative movement to provide clearing-house functions to promote the rehabilitation of the twenty-odd million existing homes in America and to create an enlarged and stabilized market for the building industry, got under way at a meeting in Chicago, March 2.

These industrial leaders unequivocally endorsed the proposal to set up a clearing house for the building industry and allied interests, tentatively named the National Home-Building Council, to promote their mutual welfare. Walter J. Kohler, president of Kohler Company, and George E. Piper of *Household Magazine*, Chicago, were named, respectively, president and secretary-treasurer of the new organization.

A report of a preliminary committee, which formed the basis for discussion at the conference covered "the need for a co-operative agency of the building industries, the scope of its activities, and its organization." This report announced the purpose of the movement as being "to establish, through co-operative effort, practical and effective means of stabilizing, maintaining and developing volume and profits within the industry." The philosophy of how this is to be achieved is outlined in the following extracts:

"The peak of new construction probably is past. It leaves the industry greatly enlarged in all its branches, units and kindred activities, but without an adequately developed outlet for its products, its services and its labor.

COUNTRY'S HOUSING STANDARD BELOW ITS BUYING POWER

"This country's housing standard is materially below its buying power and its standard of living as measured by expenditures other than for homes. The country is under-built, not over-built, in good homes — a saturation-point in attractive, comfortable, sanitary, safe and economically-constructed dwellings is virtually as far from attainment as in 1920, and the great bulk of the country's buying power still resides in homes much in need of that form of new construction mis-named remodeling, rebuilding or rehabilitation.

"Many of the soundest men in the building industry believe that a large and substantial market for all types of building material, equipment and labor can be developed in existing homes through remodeling, rebeautifying and rehabilitation. The need to-day in this development is the co-operative effort of the entire industry . . . There has developed a consensus of opinion that the industry should establish a small, but capable, organization to put this co-operative effort into effect, to enable the industry to establish and maintain in each community a satisfactory volume of business month by month."

PROGRAM OF THE COUNCIL

The National Home-Building Council is to act as a clearing house for the building industry and allied industries or interests, and to promote the following activities:

To advance standards of housing and living:

(a) Through the modernization of the substantial existing but not modern structures.

(b) Through the conservation of the capital invested in these structures and their maintenance in a more salable status.

(c) Through stimulation of the progressive rise in housing standards for all families as their income and housing requirements increase, by assisting owners in the turn-over of present property and the acquisition of better homes.

(d) Through co-operation with various allied groups and agencies to improve the standard of home equipment and furnishing.

To provide a broader and enlarged market, a more uniform monthly and yearly building activity and employment and a resultant high level of national prosperity.

To promote home ownership.

To encourage improvements in financing methods and facilities in all communities and to inform the public and trade fully regarding these facilities.

To develop, collect and disseminate information regarding the location, size and character of markets for all types of building material, supplies, equipment, labor or trade and professional service.

To encourage study and research in all important aspects of housing, social health, zoning, planning economic, civic improvement and neighborhood or community beautification.

Membership in the council is to be of two classes—active and associate. Active membership will be granted to trade associations or service groups having an important financial interest in, or allied with, the building industry. Membership will also be granted individuals, firms or companies.

Associate members will include organized groups, companies or individuals having an important interest in the housing or construction field—for instance, civic bodies, social groups, regulatory groups, fraternal or other groups.

Among the corporations and associations represented at the March 2 meeting, together with the individuals who served as delegates were:

National Pipe and Supplies Association—George D. McIlvaine, Pittsburgh, Pa.

National Association of Building Trades Employers—Oscar W. Rosenthal, Chicago.

United States League of Building and Loan Association—Henry S. Rosenthal, Cincinnati, Ohio.

Plumbing and Heating Industries Bureau—Russell G. Greviston, manager, Evansville, Ind.

Heating and Piping Contractors National Association — Harry M. Hart, president, Chicago.

Sheet-Steel Trade Extension Committee—C. L. Patterson, secretary, Pittsburgh.

Kohler Company—Walter J. Kohler, president, Kohler, Wis.

Household Magazine—George E. Piper, Chicago.

American Radiator Company — William U. Scudder, vice-president, and D. E. Kennedy, Chicago branch manager.

United States Gypsum Company—R. G. Bear, secretary-treasurer; R. J. Sterling, assistant general commodity manager, and C. O. Powell, advertising manager, Chicago.

The Celotex Company—C. E. Stedman, vice-president, Chicago.

James B. Clow & Sons Co. — W. E. Clow, Jr., Chicago.

Holland Furnace Company — C. H. Landwehr, assistant sales manager and director, Holland, Mich.

The Peoples Gas Light & Coke Co.—Charles A. Luther, assistant general manager of the new business department, Chicago.

How Should Domestic Service Water be Heated?

An article appearing in the American Gas Association *Monthly* for March entitled "How We Remove Furnace Coils —And Why" is designed to show that the use of service water heating coils in gas-fired furnaces is not satisfactory and that direct heating of the service water is more satisfactory. This article, by W. W. Schram of the Northern Indiana Public Service Company, outlines the investigation made by this company to secure data bearing on both the cost and the satisfaction attending each of these methods. Several graphs were developed from the data secured, and in summing up the analysis of these graphs, Mr. Schram said:

"Arguments used for the replacement of furnace coils by gas self-action storage-type water heaters may be classified under two heads: service and cost.

"Service arguments include:

"1. Better temperature regulation. Hot water from a self-action is always just right—never too hot—never too cold: dependable.

"2. No annoyance from pounding of the tank owing to boiling water.

"3. Elimination of the danger of bursting coils with resulting inconvenience and danger to heating plant.

"4. Better heating service. Furnace

coils reduce the heating capacity of the house heating plant.

"Cost arguments bring out the fact that hot water from a furnace coil is not free, and that while the gas bill may be slightly increased, the fuel bill for house heating will be decreased. Cost discussions usually grow into heated arguments unless they are skillfully controlled by the salesman. We find we are more successful when we avoid costs and discuss service, comfort, and convenience.

"We recognize that the problem and conditions in each community are different and the facts that we have learned about furnace coils in our territory may not be exactly the same in others, but there must be some similarity and it therefore seems logical to assume that the removal of furnace coils is a field for load building that is well worth cultivating."

Did You Know This?

Setting aside the judgment rendered in a Dallas, Texas, court, against an insurance company for damage to a boiler caused by an explosion of accumulated gas in the fire-box, the Texas Court of Civil Appeals rendered a decree that brings out an interesting point in connection with boiler insurance.

It may not generally be understood in the heating industry that standard boiler insurance policies provide only for damage done to that part of the boiler enclosing water or steam under pressure, the damage being caused by virtue of the pressure of water or steam. In other words, although the fire-box and smoke dome must properly be considered parts of a boiler, explosions of fuel, or of combustibles in these parts, or in the chimney, are specifically excluded by the phraseology of the standard insurance policy.

Preferred Utilities Convention

A THREE-DAY convention held March 5-7, by the Preferred Utilities Co., New York, at its headquarters, 33 West 60th St., drew over two hundred supervisors, salesmen and heating contractors from New England, New York State and New Jersey.

Monday—Supervisors' Day—was devoted to a joint session of representatives from the different companies whose products are handled by the Preferred Utilities Company. In the afternoon, supervisors, salesmen and officers discussed plans for the coming year. In the evening a masquerade dance was held by the employees with the officials of other companies as their guests.

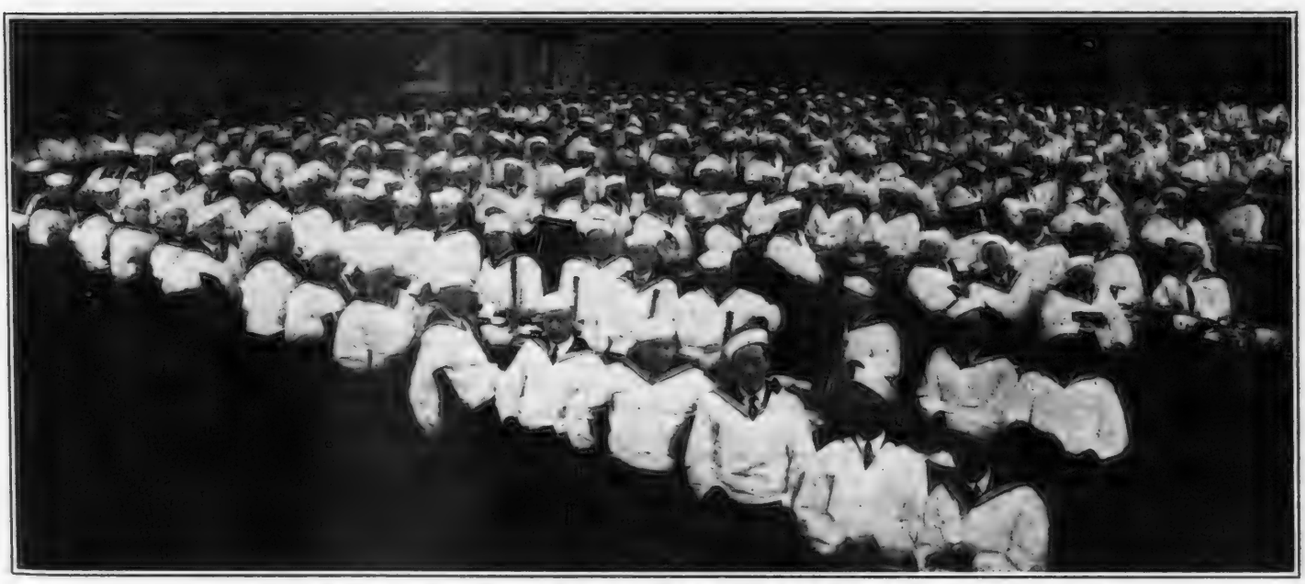
Tuesday was Hart Day. At this session all Hart supervisors, salesmen and dealers in New England, New York State and New Jersey were present. R. S. Bohn, president of Preferred Utilities Company, was chairman at this meeting and introduced Lloyd Aldrich, designer and chief engineer, Hart Oil Burners, Inc., who spent the morning going over the mechanical construction and installation of Hart burners. Other speakers were Mr. Smithson of the Mace Advertising Agency, who handles the Hart account; W. D. Chamberlain, advertising manager of Preferred Oil Burners, Inc.; W. H. Mathieson, assistant sales manager, Hart Oil Burners, Inc., and Earl Newson of the Oil Heating Institute.

Tuesday evening, following an informal day of conferences, was another session at which J. S. Kaplan spoke on "Co-operation with Architects"; George P. Gregory discussed "Control Equipment and Preferred Accessories for the Proper Oil-Burning Installation"; L. A. M. Phelan, president of the Absolute Con-Tac-Tor Company, told of the products of his company, as did J. P. Keene, president of the Youngstown Tank & Boiler Company, and G. W. Willard, engineer of the King-Seeley Corporation, W. S. Goodwin closed the meeting with a talk on salesmanship.

Wednesday was Ray Day. The morning session was devoted to a discussion of the mechanical features of the burner, led by Renee Vidalie, chief engineer of the W. S. Ray Mfg. Company, San Francisco, and W. A. Ray, Jr. The afternoon session was addressed by F. P. Mudgett and G. Stanley Meikle, of the Minneapolis-Honeywell organization. Harry Tapp, technologist of the American Oil Burner Association, spoke on "Why Every Dealer Should Belong to this Association." The meeting was closed by another sales talk by W. S. Goodwin.

Wednesday evening the convention was closed with a banquet aboard the U. S. S. Illinois, docked in the Hudson River. All members of the Preferred Utilities Company, together with their dealers and guests, assembled at the company's office and were carried in special buses to the dock where they were received with a noisy salute by the crew of the Illinois. Donning regulation navy blouses and caps, 260 men sat at the festive board and, after a hearty beefsteak dinner, listened to a few short but interesting talks by L. D. Becker, secretary of the American Oil Burner Association; P. E. Fansler, associate editor of THE HEATING AND VENTILATING MAGAZINE; A. E. MacInnis, president Hart Oil Burners, Inc.; W. A. Ray, Jr., of the W. S. Ray Mfg. Co.; F. T. Fisher of G. L. Olston & Company.

The guest of the evening was Capt. Irving O'Hay, the well-known soldier of fortune. Captain O'Hay held the rapt attention of his audience for nearly two hours, telling them of his adventures in the eight wars in which he has participated. The meeting then adjourned to the fore part of the ship where several boxing matches completed the evening's entertainment.



Nearly 300 Navy-Garbed Participants of Annual Banquet of Preferred Utilities Corporation Held on Training Ship, U. S. S. Illinois

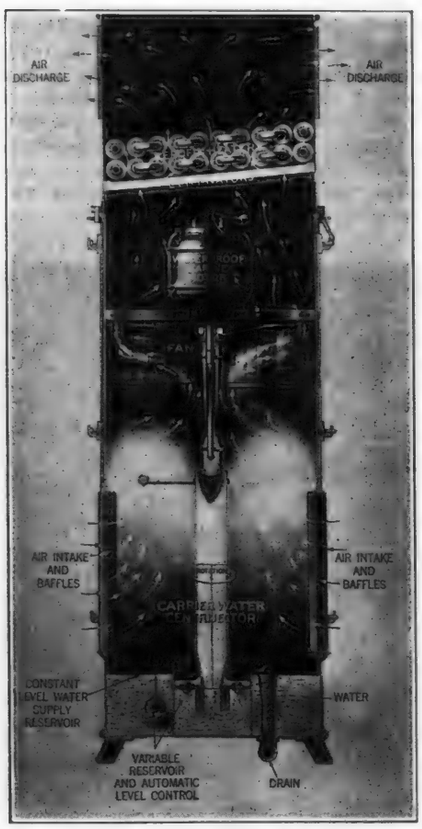
New Apparatus and Appliances

Carrier Unit Air Conditioner

THE long-anticipated Carrier unit air conditioner has been placed on the market by the Carrier Engineering Corp., Newark, N. J., making what this organization terms "manufactured weather" available to the owner of a small manufacturing plant or to the largest industrial institution or theater in the country.

With characteristic thoroughness, this organization has refrained from placing what might be called an experimental or partially-developed type of equipment on the market, and this new unit has every appearance of being a finished product both in design and construction. It is of interest to note that the design is not based upon a scaling down of the enormous plants developed by Carrier to meet the loads found in large theaters and industrial plants.

This machine has been conceived and worked out on a basis that makes it almost as portable as a desk fan. It consists of a cabinet 7 ft. 8 in. in height, with lateral dimensions of 2 ft. 6 in. by 2 ft. 8 in., the floor space required being less than that occupied by an ordinary office desk. The casing is an assembly of die-stamped and welded steel plates, the entire surfaces being finished in green baked enamel, similar to that used on high-class office furniture. On opposite sides of the cabinet are two readily removable panels. The lower part of each of these is equipped with baffle plates through which air is admitted to the unit. At the top of the cabinet, on all four sides, are air-distribution outlets which can be closed or opened, providing full flexibility for air distribution in any or all directions from the cabinet.



Schematic Arrangement of Carrier Unit Air Conditioner

The consecutively-performed functions of the unit are: to wash the air which is drawn into and delivered from the unit; to reduce or increase and control the atmospheric humidity according to requirements; to heat or cool the air according to requirements and to deliver the air to the room which is to be conditioned. The unit has a capacity of 2500 cu. ft. of conditioned air per minute, sufficient to provide a complete change of air each ten minutes in a room 25 ft. by 100 ft. by 10 ft. The humidifying portion of equipment will handle 27 gal. of water per minute at a pressure of 40 lbs. per sq. in., sufficient to saturate completely the air passing through the unit at any temperature over a very wide range and to produce unusually effective results when refrigerated water is used to accomplish cooling and dehumidification.

A single 1 H.P., totally enclosed, marine-type motor, forms the motive power. At the bottom of the unit is a constant-level water reservoir communicating with an inner reservoir to which the water is admitted or cut off by automatic control. From the inner chamber the water is admitted to the lower end of a vertical cylinder rotated by the motor. A rustless-steel, flexible coupling, carried in a safety sleeve provides a self-aligning drive. At the bottom, the hollow tube is carried in a self-aligning bushing supported by rubber rings.

Air is drawn from the room or from a connection leading outdoors through the baffle plates. As the air is drawn in, it comes immediately into contact with a dense cloud of finely-atomized water. This spray is utilized to wash the air, freeing it from dust and solid matter, and to saturate it at the temperature of the spray water. The saturated air is drawn vertically into a centrifugal fan of special design and, from its discharge, passes through "eliminators"—a series of metal plates arranged across the entire area of the cabinet, which allow the free passage of the air but obstruct the passage of all particles of free, unevaporated water carried from the spray chamber. The air then passes through an Aerofin heater where it absorbs heat up to the desired point under thermostatic control. From the compartment immediately above the heater the air passes through openings on any or all sides of the cabinet. The velocity of delivery plays an important part in securing the required distribution of air through the area which the unit is designed to supply.

The descriptive term "Centrijector" is given to the vertical hollow tube-assembly up which the water is drawn by centrifugal action and from which it is discharged through six radial pipes, each terminating in a standard Carrier spray nozzle. The water is discharged from the nozzles at right angles to the pipes, and contrary to the direction of rotation. The reaction of the discharging water serves to drive the rotating pipes forward, the action being similar to that of a revolving water sprinkler, thus minimizing the amount of power required to supply the unit. The effect of this revolving spray is to fill the chamber completely with a water mist through which the incoming air passes. It is stated that the static efficiency of the multi-blade centrifugal type fan is well above 50% and that the fan will deliver 2500 cu. ft. of air per minute with a measured power consumption of 0.6 H.P.

This Carrier Unit Automatically Provides Conditioned Air

The motor is of special design, totally enclosed so as to be moisture proof, and as an additional precaution, the windings are moisture-proofed by special impregnation. The shaft is of corrosion-resisting nickel steel operating on ball-bearings. As the motor operates directly in the path of rapidly-moving, completely-saturated air, the small amount of heat dissipated from the windings is rapidly carried away, resulting in a low temperature during continued operation.

The motors are rated at 1 H.P., 1160 R.P.M., and are furnished for operation on single phase, polyphase or direct-

current circuits. The polyphase motors are supplied with windings so arranged that they can be operated at either 220 or 440 volts without internal winding changes. It is stated that under average operating conditions the water evaporated by the unit amounts to about 0.75 lb. per min., or between 40 and 50 gal. in a 12-hour day.

Arrangements are made to drain and flush the water tank periodically to remove the dirt washed from the air. When it is desired to maintain conditions of temperature and humidity below those normally possible to obtain by evaporative cooling, it is necessary to supply water to the unit at a temperature below the dew-point or saturation temperature of the entering air. The source of low-temperature water may be from a well, or the water can be cooled by refrigeration.

Automatic humidity and temperature-control instruments are supplied with each unit to meet the particular requirements imposed by the air conditions which are to be maintained. There are twelve standard control combinations, one of which will be designated upon examination of the requirements of each application.

Duplex Boiler Feeder Has Self-Grinding Valves

A refinement in boiler-feeder design is announced by McDonnell & Miller, Chicago, in the shape of a Duplex boiler feeder, embodying ruggedness, simplicity in construction and rotary valves of unique design.

The only working parts are a single, 6 in. seamless float, a float-arm, and a horizontal shaft to which the two rotary valves are attached. All of these parts assemble into a single unit, eliminating lost motion and reducing friction to an almost negligible minimum.

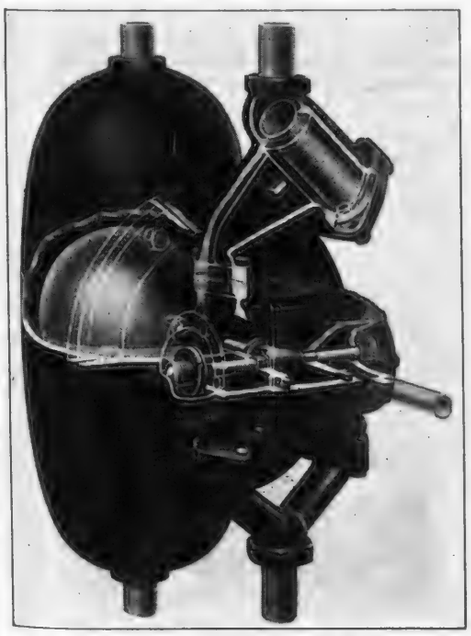
Instead of the usual sliding valve, this new feeder is equipped with two rotary valves, the purpose of which is to overcome the sticking and wire-drawing to which sliding valves are subject where feed water is exceptionally hard. By providing rectangular orifices in the valve discs, it is possible to avoid the slightly cracked condition which is so common in sliding valves—the condition which is largely responsible for wire-drawing, particularly where there is a great amount of precipitate in the water. An even more important advantage of the rotary valve is the "self-grinding" effect. Each time the feeder is open, the bronze valve-disc turns on a Monel seat, thus "working in" to an increasingly tight closure.

The action of these self-grinding valves is described as similar to that of the sleeve-valve in a Knight-type engine—they work into a better and tighter seat the more they are used.

In this design, the valves are removed from the high-temperature condition of the float chamber and therefore are not subjected to water which has been raised to the critical temperature at which scale forms.

An interesting feature is the provision for changing the water level through 2 in. after the feeder has been installed. To make this adjustment it is merely necessary to remove the supply-valve disc and move it to one of three numbered positions. The adjustment can be made in five minutes. The overflow valve can also be adjusted and thus, by changing the relation between its opening and the closing point of the supply valve, it can be adjusted to give 2 in., 3 in., 4 in. or 5 in. differential in action.

To make operation under all feed-water conditions doubly certain, a particularly large strainer is provided.



A Boiler Feeder with Rotary Self-Grinding Valves

Airmat—A New Air Cleaner

Although there is nothing new under the sun, it would appear that the National Air Filter Co., Chicago, has produced something unique in a fixed air filter. This new device, known as the "Airmat," is built up as small cabinets, each 12 in. by 12 in. by 24 in. Each of these units is filled with frames set in zig-zag arrangement, each frame carrying a sheet of fibrous material composed of eight layers, the aggregate being only about ⅛ in. thick. The material is so light that the 4 sq. ft. in each mat weighs only 4¼ oz.

Photo-micrographs of this material show it to be honeycombed with innumerable tiny openings which permit the air to pass with very little resistance, but the low velocity and tortuous movement cause precipitation of dust particles in the mazes of the mat. It is said that this material combines superlative filtering quality with an abnormal ability to absorb moisture and oily vapors. Each of the units is rated at 1000 cu. ft. per minute and for capacities above this the sections are built up like filing cabinets or bookcase sections.

A feature of this unit is the ease with which dirty mats are replaced by clean ones. It is said that renewals can be made without soiling the hands. The mats are provided in boxes of seventy-five each, cut to size, ready for use. The frame with its soiled filter is removed from its guide and replaced with one containing a clean filter. The soiled sheet, when removed from its frame, is thrown away. The cost of replacement is said to be abnormally low.

Three-Section Cabinet Filters Using Airmats Arranged in W Formation

A Portable Water Room Heater

Designed to burn gas or kerosene and to function as a portable water heater, the Heat Wave is manufactured by the Kuenz Radiator Co., Jackson, Mich. The heating surface consists of a section of extruded copper tubing, similar to that used in D-H-4 radiators during the war. A 9-in. fan is placed back of this core, forcing the air over several thousand square inches of water-backed surface. The resulting flue-gas temperature is exceedingly low and, if desired, the Heat Wave can be used as a miniature warm-air furnace of high efficiency.

A Packing Material Formed on the Job

A material for use in packing glands or other containers required to be tight is manufactured by the Alfit Packing Company, Inc., and handled through its New York representative, Michael J. Clafter, 299 Broadway, New York. This is a dough-like material that can be formed quickly by hand into any desired

shape to meet the requirements. This material, originally, was brought over from Europe, is non-fibrous and has been used many years to pack joints against high- and low-temperature steam, water, oil, ammonia and other liquids. Under pressure conditions it combines a tight metallic bearing with self-lubricating qualities, reducing friction in glands carrying moving rods. It is elastic and greasy and can be removed at any time desired.

Cyclo-Fin Unit Heaters

Combining an extended-service heater, built up of copper tubing, with a helical brass ribbon fin, and a Garden City propeller-type fan driven by standard motor, the Garden City Fan Co., Chicago, announces a suspended-type and a floor-type unit heater. The heating element is built up of seamless copper tubing, three tubes deep, the lengths of the tubes varying with the size of the unit. The tubes are mechanically pressed into supply and exhaust headers and are guaranteed for pressures up to 50 lbs. of steam for the low-pressure type, and 350 lbs. for the high-pressure type.

Motors are of the slow-speed type and can be had for constant or variable speed. The low-pressure units are made in three sizes, capable of supplying from 114,000 B.T.U. per hour to 548,000 B.T.U. per hour. The extended-surface high-pressure coils also are available in proper casing for direct heating purposes.

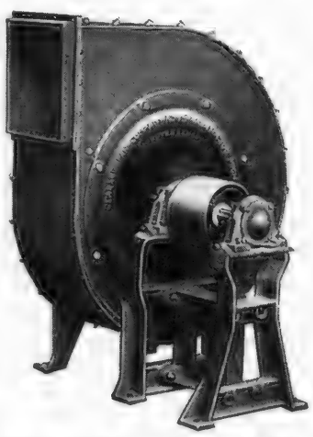
Floor-Mounted Cyclo-Fin Unit Heater

Clarage Exhauster for Specialized Application

Combining a standard and uniform casing with any one of six specially designed wheels, the Clarage improved exhauster is made adaptable to many special applications. The exhauster is made in a number of sizes, all with slow speed motors, and is adjustable for any one of eight different directions of air discharge as well as being reversible either for clockwise or counter-clockwise rotation. In designing this unit, all anchor-bolt holes for securing the exhauster to its foundation were located in line, simplifying installation.

One type of wheel is designed for cotton ginning and can be used for other classes of high-pressure exhaust where materials, if handled, do not pass through the fan. The rim-type wheel is recommended for medium and low-pressure exhaust work, handling gases, fumes, dust and light materials. A wheel of special design will handle cotton, carrying it directly through the fan. A paddle-type wheel is built to handle shavings and similar material through the fan at standard speed, while another design is for handling material through the fan at especially low operating speed. As optional equipment, SKF self-aligning ball bearings may be had. These are mounted in sealed cases which are dust-proof and oil-tight.

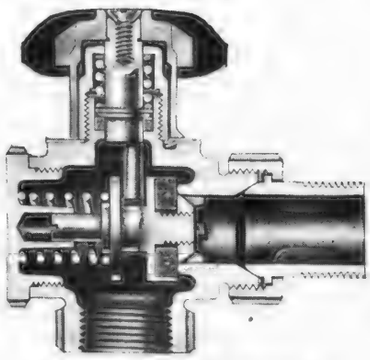
This line is manufactured by the Clarage Fan Co., Kalamazoo, Mich.



Six Different Runners Can Be Used in This Standardized Clarage Casing

Change in Design of Jenkins Valves

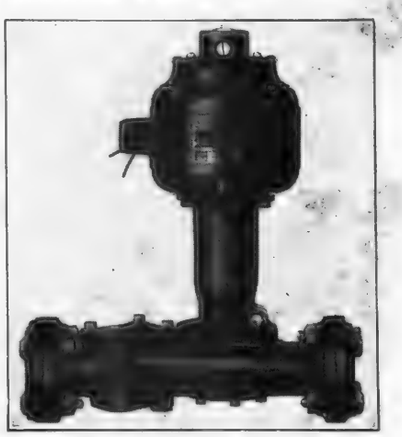
It is announced by Jenkins Bros., New York, that the design of their No. 700 modulating valve has been altered by the adoption of a mushroom type of rubber composition hand wheel replacing the lever control formerly used. The design of this valve features a vertical seat and disc with the valve so constructed that the vacuum is always under the disc, preventing any loss of vacuum when the valve is closed. With this construction coarse sand from radiators cannot lodge on the seat. The spindle on which the hand wheel is mounted accurately controls the steam flow through the action of a cam on its lower end, the amount of opening being clearly indicated externally by a dial.



New Hand Wheel Designed for Jenkins Valves

Hydrolator Stimulates Circulation

A device designed to increase the circulation in water heating systems has been placed upon the market by the Janette Mfg. Co., 556 West Monroe St., Chicago, under the trade-name Hydrolator. This device consists of a section to be connected into the boiler return, the section being so arranged that it constitutes a portion of the return line. A small high-speed motor directly drives the impeller, so located that, when the motor is not running, the impeller offers substantially no increased resistance to flow. With the motor in operation, the impeller drives the water into the boiler return, greatly augmenting the circulation and making it possible to get increased capacity out of the boiler. The device is practically noiseless, is sturdy in construction and its cost of operation is almost negligible.

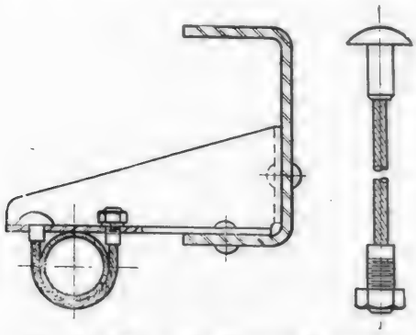


The Hydrolator Stimulates Sluggish Circulation in Water Heating Systems

Flexible Bolt Has Many Possibilities

Bolts so flexible that they literally can be wrapped around a pipe without using tools, have been developed by the American Cable Co., 215 N. Michigan Ave., Chicago. These flexible bolts can be used in many places where rigid U-bolts are impracticable. They can be used for hangers for overhead steam or water piping, for shackle bolts, scaffolding and tackle, and in other places where semi-flexible connections are desired.

The principle on which the new flexible bolt rests is the preformed type of wire rope. Preforming the wires and strands to the exact helical shape they must assume in the completed rope results in a cable that does not require seizing but may be cut like a rod. This type of rope permits a close-fitting attachment to be slipped over the unseized end of the rope and to be processed so that the steel of the fitting cold flows into the interstices of the rope and thus



Flexible Bolt and a Typical Example of Its Application

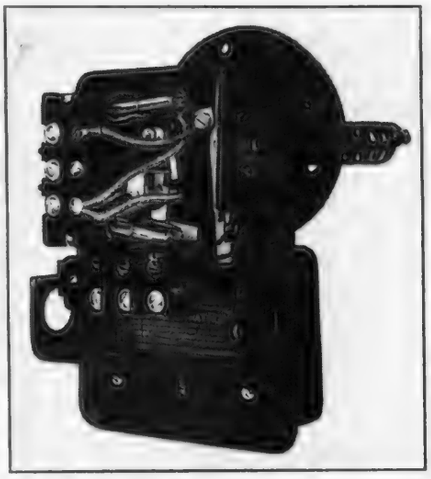
becomes practically an integral part thereof. Naturally such fittings can be threaded for a nut or capped for a head. The flexible bolt which has resulted from these developments is available in varying lengths and holds promise for universal acceptance.

Burner Boss "Bosses" Oil Burner

A unique safety and sequence control, designed to simplify oil-burner construction and to minimize the cost of the control system, is announced by the Absolute Con-Tac-Tor Corp., Elkhart, Ind.

The burner boss supersedes the No. 111 Warpswitch and the No. 48C Stackswitch in providing the complete functions of these instruments in a single stack-mounted unit. It also adds new features of dependable operation and safety.

The unit is mounted in the flue-pipe from the boiler or furnace in which the oil burner is installed. The sequence of its operation is governed by the same type of stack-temperature element that has been used in the Stackswitches. The timing of the ignition and the cut-out



A Con-Tac-Tor Device for Sequencing Oil-Burner Controls

for the safety also are controlled by the twisting of the bi-metallic elements, which is caused by the stack temperature. Should the flame or voltage fail, manual resetting is accomplished by throwing a built-in snap switch. The burner boss measures 7½ in. in height and is furnished with a flange for pipe mounting. It is listed as standard by the Underwriters' Laboratories.

York Super-Fin Heating Coil

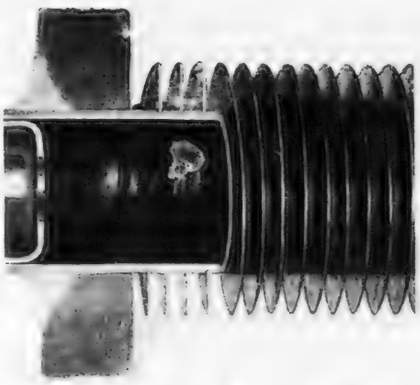
A heating coil adapted to either low or high-pressure steam, and incorporating several interesting features in design and construction, is announced by the York Heating and Ventilating Corp., 1502 Locust St., Philadelphia, Pa. The coil is made up of a number of copper tubes extending between steel headers.

The tubes are of heavy copper on which the ribbon is spun spirally in such a manner that the edge of the ribbon is tightly embedded in the wall of the tube for a depth of .025 in., making a secure, permanent and intimate contact for effective heat transmission without the use of solder or tin as a binder. The fins have straight smooth sides for cleanliness and low resistance.

The tubes are fixed to heavy steel header plates with a fused-metal joint to insure ruggedness, long life and the elimination of leaks. The header is completed by a heavy pressed-steel cover, welded to the header plate. The threaded nipple for the attachment of the steam line is drawn integral with the cover, which is shaped so as to insure equal steam distribution on the inlet side and proper drainage on the return side.

The return and supply headers are both at the same end of the coil and connected by return-bend pipes; each of these pipes has continuous drainage slope from supply to return end, so that the coil will drain freely when its face is in either a vertical or horizontal plane.

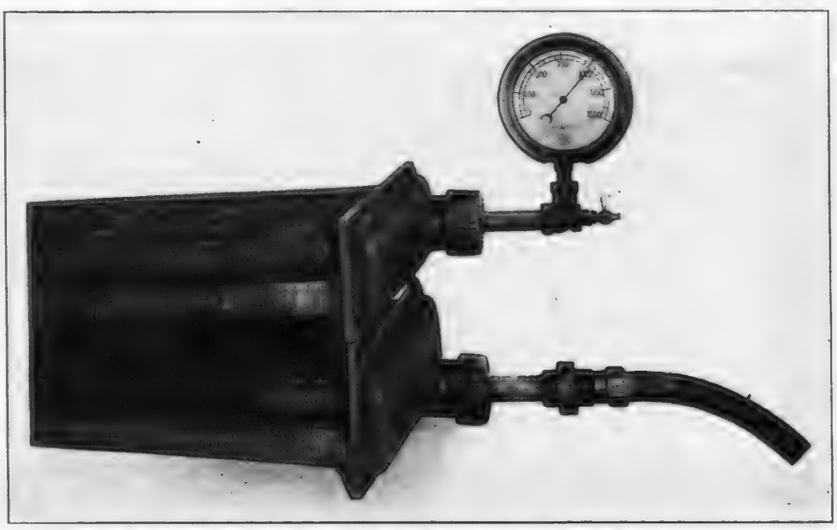
The return-bend construction offers another advantage. The bent end of each tube is free to move with the expansion or contraction of the tube, in-



Detail of Tube and Ribbon Assembly of York Super-Fin Heating Coil

dependently of any other tube in the coil. In this way expansion strains on the headers and joints are avoided.

The coils are made in several sizes that may be stacked in multiples to provide any required face area, and are built with the equivalent of 1, 2, 3 or 4



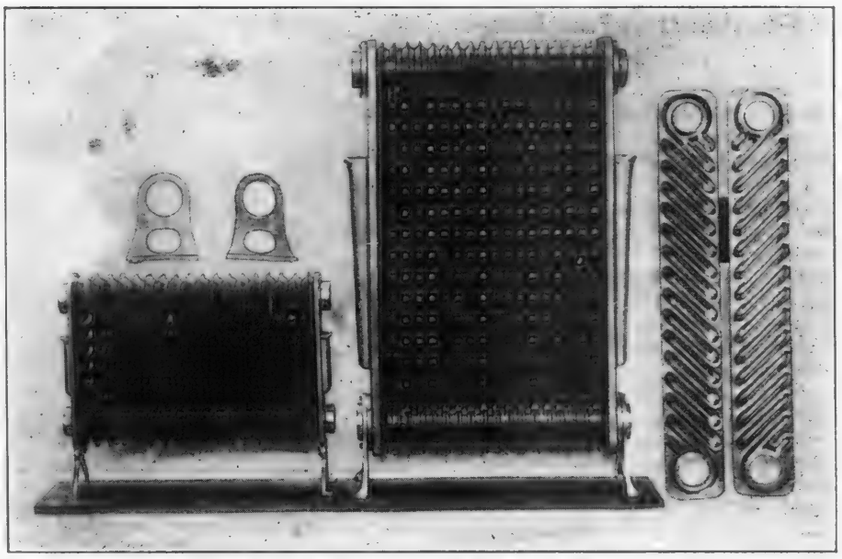
Super-Fin Under 1000-Lb. Hydrostatic Pressure Test

rows of tubes in depth in a single casing, so that 4 deg. of temperature rise can be provided for, before it is necessary to add another casing to increase the depth. Because the return and supply header are at the same end, these coils may be placed end to end. This is of advantage where head room is low.

This coil is tested to 1000 lbs. hydrostatic pressure and is guaranteed for pressures up to 200 lbs.

Murray Copper Radiators

A novel non-ferrous radiator in which there is no extended surface, all portions of the metal being steam or water backed, is manufactured by D. J. Murray Mfg. Co., Wausau, Wis. The sides of the sections are corrugated and, when assembled, each corrugation crosses the corrugation in its companion plate at right angles, neutralizing stresses set up within the sections. The heat transfer is not in excess of that of standard cast-iron radiation when the radiator is used for direct heating, but when used for indirect purposes, the transfer is greatly increased. Pockets are cast in the end sections to hold water for humidifying purposes. The radiators are only 4 in. in width with a varying number of heights and lengths. This radiation has been tested through the last two years with steam pressures up to 125 lbs.



Murray Copper Radiator with All Surfaces Primed

Automatic Stoker Designed to Burn Screenings

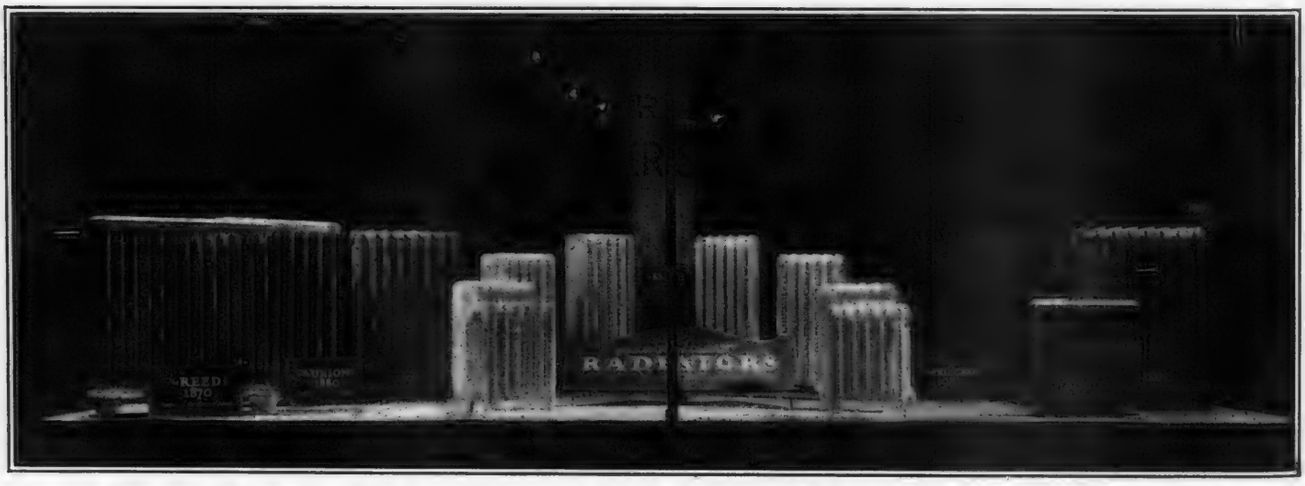
A comparatively new device for the automatic burning of screenings in heating plants of apartment buildings, hotels, hospitals and similar buildings has been brought out by the Modern Coal Burner Company, 1601 McCormick Building, Chicago. This equipment consists of a retort, taking the place of the usual grate, and connected to an outside coal hopper by a tube in which a screw conveyor rotates. This screw is belt-driven by an electric motor mounted behind the hopper. The end of the retort farthest from the hopper is inclined upward, and the action of the screw conveyor pushes the fresh coal up and into the lower part of the fuel bed. The intense heat from above reduces the coal to gas and coke. The gases are mixed with a controlled supply of air, under pressure, and must pass through the incandescent fuel bed, which procedure insures smokeless combustion. These stokers are made to fit boilers developing from 50 to 60 H.P., and particularly for use in sections where screenings are cheap. It is stated that the difference in price between the high-grade coal required for hand-firing and the cheaper grade used in this stoker will effect savings equivalent to the initial cost and maintenance of the stoker in from one to three years.

Evolution of the Cast-Iron Radiator

A NOTABLE window display in the New York salesroom of the H. B. Smith Co., 10 East 39th Street, demonstrates, in an interesting manner, the development of the company's cast-iron direct radiators from the period of about 1860 up to the present time. The small Whittier radiator, shown on the right, was one of the first types to be manufactured and bears an interesting resemblance to the indirect pin radiators now in use.

The next step is the Reed, which has a cast-iron base with a removable cast-iron top. The Union type sections were made in more of the tube pattern, with the base eliminated, but this radiator still had the removable cast-iron top. Among the ornamental radiator styles, the Royal marked the first step and the Imperial went even a little further in the matter of decorations. This was followed by the Princess, which was the company's standard radiator up to the latter part of last year, when the company brought out its new Tube type.

There are many other models in between the dates mentioned, but the ones shown were selected as indicating the contrast between the prevailing styles of different periods. As the H. B. Smith Co., is one of the oldest manufacturers of cast-iron boilers and radiators, this review of its product has historic interest.

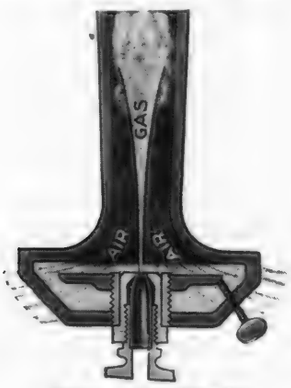


Display in Window of H. B. Smith Company's New York Salesroom Showing Evolution of Radiator Design

New Trade Publications

INSTALLATION DATA FOR THE GORTON SINGLE PIPE VAPOR HEATING SYSTEM is presented in a circular issued by Gorton Heating Corporation, 96 Liberty Street, New York. A diagram shows a typical double-circuit lay-out and the text covers the essential features of this system. By using the Gorton vapor draft regulator a close regulation can be secured, as it will close the draft-door on less than 3 oz. pressure.

JOHNSON INDUSTRIAL GAS APPLIANCES are described in a loose-leaf catalog issued by the Johnson Gas Appliance Co., Cedar Rapids, Iowa. In this catalog is featured a comprehensive line of gas appliances for lighting and heating Bunsen burners, torches and furnaces. The Johnson combined air mixer and



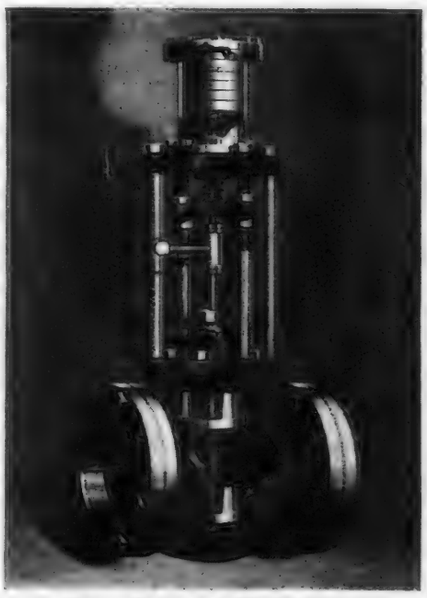
Johnson Gas Nozzle

Venturi tube is a device to mix air and gas properly so as to produce maximum efficiency. This feature operates fundamentally on the Venturi principle and, it is stated, results in thorough mixing in the desired proportions. This company also specializes in the manufacture of heat-treating furnaces and other furnaces for industrial applications.

THE AUBURN FIREMAN is the subject of a circular prepared by the Auburn Stoker Corp., Auburn, Ind., in which this automatic stoking device is illustrated and described. These units are built in sizes ranging from 5 H.P. to 140 H.P. boiler rating, taking care of from 500 to 15,000 sq. ft. of steam radiation. Another style of Auburn stoker is designed for larger boilers. It is stated that the smaller unit can be installed and put into service within four to eight hours under any make of small or medium-sized boiler. It requires no ash-pit below the floor level and fits under boilers with only 13½ in. clearance. In the operation of this stoker a reciprocating ram is employed to feed the fuel into the furnace, the mechanism being driven by an electric motor that also furnishes a forced draft for combustion. Should anything occur to stall the motor, the entire equipment automatically stops and an alarm bell is rung.

H & C WROUGHT-STEEL WARM AIR REGISTERS are described and illustrated in a catalog of unusual make-up, published by The Hart & Cooley Mfg. Co., New Britain, Conn. For twenty-five years the company has specialized in this equipment, and, following the engineering trend of development in warm-air heating, has brought out new models and patterns of grilles in which the free-air area has been increased 25%, permitting the use of smaller openings than heretofore. This has been accomplished by doubling the web entirely on itself, instead of forming it in a semi-circle, as had been done in the past. The catalog is well illustrated in color and the tabulation of engineering and price data leaves nothing to the imagination. Size 7½ in. x 10 in. Pp. 62.

KLIPFEL AUXILIARY-OPERATED VALVES are described in Bulletin 128 issued by Klipfel Mfg. Co., 2641-59 W. Harrison St., Chicago. These valves are of the piston-operated type, either spring opening or spring closing, and are manufactured in sizes from 2 in. to 16 in. The auxiliary control equipment may be had in either weight-loaded or spring-loaded type. These valves, in connection with the auxiliary controls are designed for service where ordinary self-contained regulating valves will not function satisfactorily, due either to extreme variation in the initial pressure, high steam load or to very great variation in the demand for steam to be controlled. Pressure regulation is guaranteed to within 2% whether the required reduced pressure is below atmosphere or up to 400 lbs. pressure.



Piston-Operated Klipfel Valve

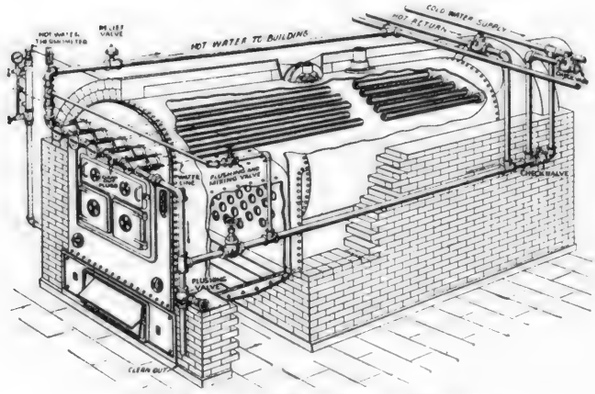
DURIRON EXHAUST FANS are featured in Bulletin No. 140-A issued by the Duriron Co., Inc., Dayton, O. This bulletin is devoted to the engineering and mechanical features of Duriron fans, which, due to the material used in their construction, are especially adapted to

The Use of Special Materials Adapts This Duriron Fan to Applications Where Corrosive Fumes Are Found

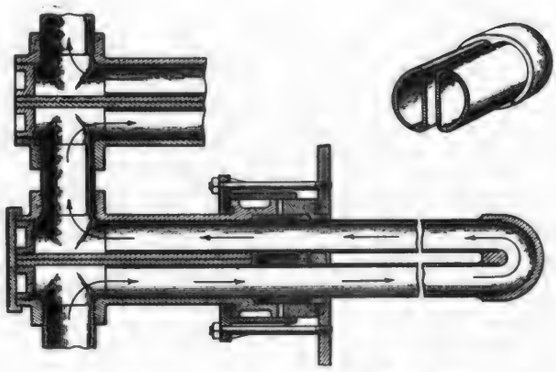
such applications as ventilating chemical hoods and other locations where corrosive acids, acids and fumes are found. These fans are built in many sizes, arranged to handle from 100 C.F.M. to 5100 C.F.M.

AEROVANE BLOWERS are described in catalog No. 32 issued by the Bayley Blower Co., 732 Greenbush St., Milwaukee. These forced-draft blowers are regularly built double width with a double inlet and independent pedestal bearings. The hub is built up on two cast-steel independent cones, between which, before they are riveted together, is fitted a steel-plate central ring, cut from a solid plate on a boring mill to both inside and outside diameters. Either 32 or 64 floats or vanes are used for each wheel, according to type. The catalog contains an elaborate tabulation of dimensional and performance data, as well as illustrations of blower details and of typical installations. Size 8½ in. x 11 in. Pp. 34.

YOUR HOME IS WHAT YOU MAKE IT is the title of a little folder now being circulated by Acme Radiator Shield Co., 48 Vine St., Cincinnati, O. Here are illustrated and described several types of "Modern" art radiator cabinets. These cabinets are made in a variety of sizes and finishes, so that they will harmonize with the furniture and fittings in almost any kind of room. They are built of 14-gauge and 18-gauge furniture steel over angle-iron frames, and all joints are reinforced and welded, making the entire cabinet practically one-piece construction. The finishes are of baked enamel—walnut, mahogany, oak, or any flat color desired to match particular decorations.



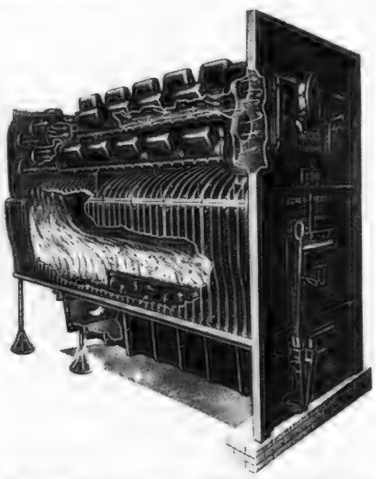
Installation of Triad Water Heater



Detail of Triad Submerged Coil Water Heater

TRIAD SUBMERGED-COIL WATER HEATER is the caption of a small circular issued by Triad Products Company, 5113 North Clark St., Chicago, and descriptive of the Triad submerged-coil water heater. This device consists of a series of copper tubes extending the full length of a horizontal boiler, above the crown sheet, and totally submerged in the water. A specially-designed Venturi tube is connected in the flowline of the cold-water supply, and so connected to the hot water return that it creates a forced circulation and acts as a preheater by mixing the incoming cold water with the hot return, this being in proportion to the amount of water used in the building. This partly-warmed water enters the first coil loop, flowing to the rear of the boiler and returning to the front, then crossing to the next loop, and so on until it leaves the last section of the coil at a temperature not exceeding 190° F. A feature of this device is the arrangement of clean-out plugs at the front end of the boiler.

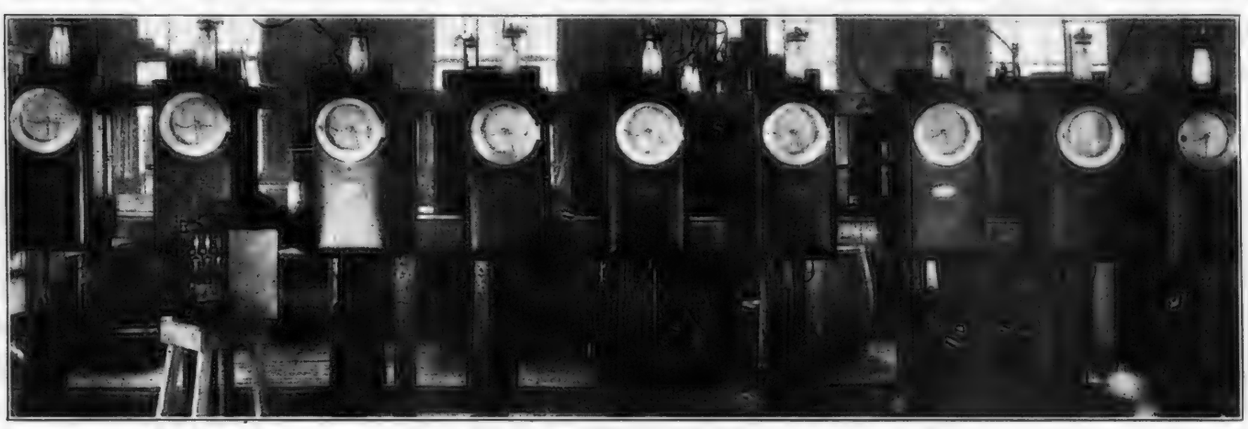
HAYS CO_2 AND DRAFT RECORDER is described in catalog RL27 issued by the Hays Corp., Michigan City, Ind. This is a simplified and improved automatic draft recorder designed for permanent installation in an engine room, and guaranteed accurate within 0.5° of CO_2 at any range on the chart. A steel tank holds enough caustic solution for six to eight months' service, and recharging is a simple operation requiring only a few moments. The instrument operates with a very small lag, as 80 ft. of ½-in. pipe is cleared per minute. The instrument is rugged in the extreme, and not likely to get out of order or adjustment. The catalog is especially well illustrated with photographs, diagrams, drawings, and reproductions in color of typical charts. The operation of the CO_2 recorder is explained in considerable detail, and the catalog in itself is almost a treatise on the subject of gas analysis and draft determination.



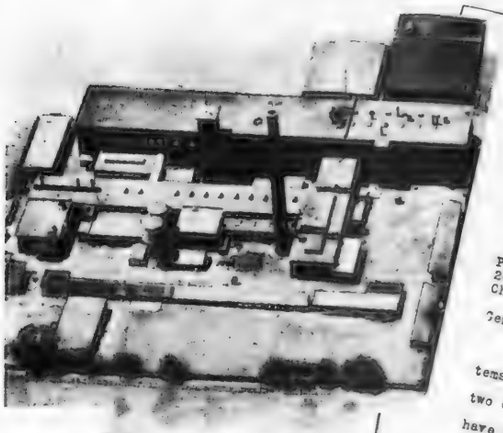
National Horizontal Tubular Heater

THE NATIONAL SYSTEM OF HEAT WITH VENTILATION is described in Catalog No. 35 issued by the P. H. MaGirl Foundry and Furnace Works, Bloomington, Ill. This literature features a horizontal sectional warm-air furnace of unusual design for use either with coal or with oil fuel. There are four types of horizontal tubular heaters designed especially for schools, churches and other types of buildings. The feature of this system is the application of a fan by which fresh air is drawn in and forced over the heater into a pressure or plenum chamber, from which individual ducts carry the air to each room. Adjoining the plenum chamber is another pressure chamber containing tempered air. A mixing damper, controlled by an automatic thermostat in each room, allows either warm or tempered air to enter each duct. Through the action of the fan, this air is forced into the room and diffused and exhausted at the floor line through vent openings where it is either carried to the outside or is recirculated as may be desired. Rocking interchangeable grates are used, the front and rear sections of which can be operated independently of each other, permitting one portion of the fuel bed to be cleaned without disturbing the remainder of the fire. Pre-heated air is introduced to the fuel bed through side linings, aiding combustion and increasing the over-all efficiency of the heater. The last section of the catalog is devoted to photographs of buildings in which National equipment has been installed.

CLARAGE NEW UNIT HEATER is described in a small circular issued by Clarage Fan Co., Kalamazoo, Mich. This is built in both ceiling and floor types, and an outstanding feature is the design of the fan by which air is distributed direct from the fan in all horizontal directions.

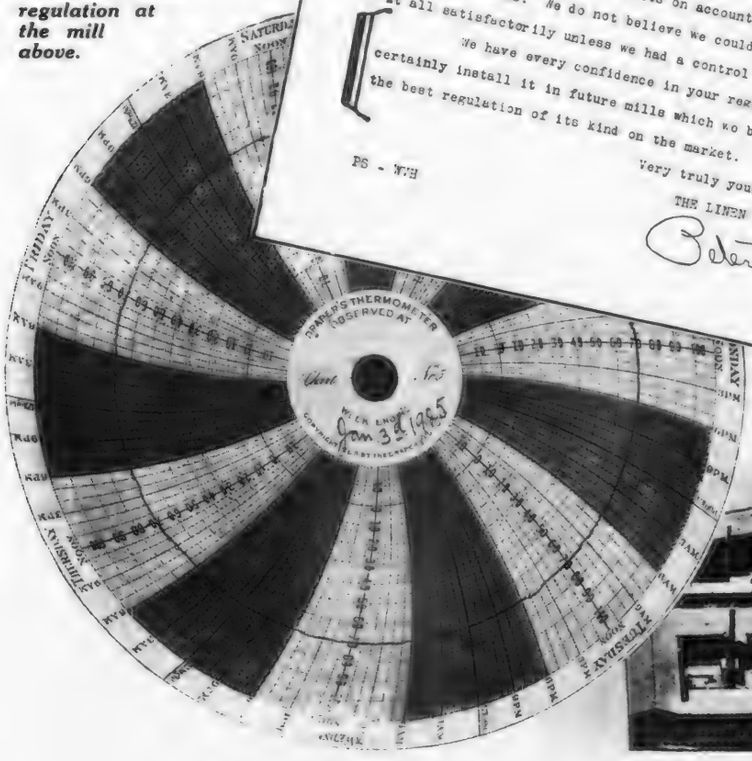


Testing Hays CO_2 Recorders



Jute Mill of the LINEN THREAD CO. at Kearney, N. J.

Chart below shows very accurate control obtained with Powers regulation at the mill above.



The Linen Thread Company,
Mechanical Department
GRAND ST. Paterson, N.J. Feb. 12, 1926.

Powers Regulator Co.,
2720 Greenview Ave.,
Chicago, Ill.

Gentlemen:-

Some two years ago we investigated the different systems of heat control with a view to installing such systems in two of our mills. Would say that since that time installations have been made in the Finishing Department and Office at our Grand St. mill and in the entire new Jute Mill at Kearny, N. J.

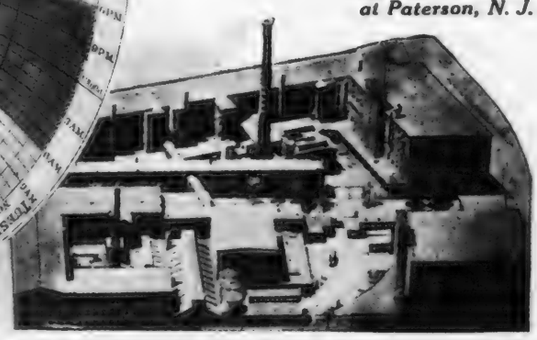
We have kept accurate temperature records of heat in these rooms at various times and would say that the results accomplished by your control are certainly remarkable, particularly in our Jute Mill at Kearny where we need to control the temperature within very close limits on account of certain manufacturing processes. We do not believe we could have run this mill at all satisfactorily unless we had a control such as yours.

We have every confidence in your regulation and would certainly install it in future mills which we build, it being the best regulation of its kind on the market.

Very truly yours,
THE LINEN THREAD COMPANY
Eder Smith

PS - W:H

Grand Street mill of the LINEN THREAD CO. at Paterson, N. J.



THE POWERS REGULATOR CO.

36 years of specialization in temperature control

2718 Greenview Avenue, Chicago

New York, Boston, Toronto, Los Angeles, and 30 other cities.

(RC3597)

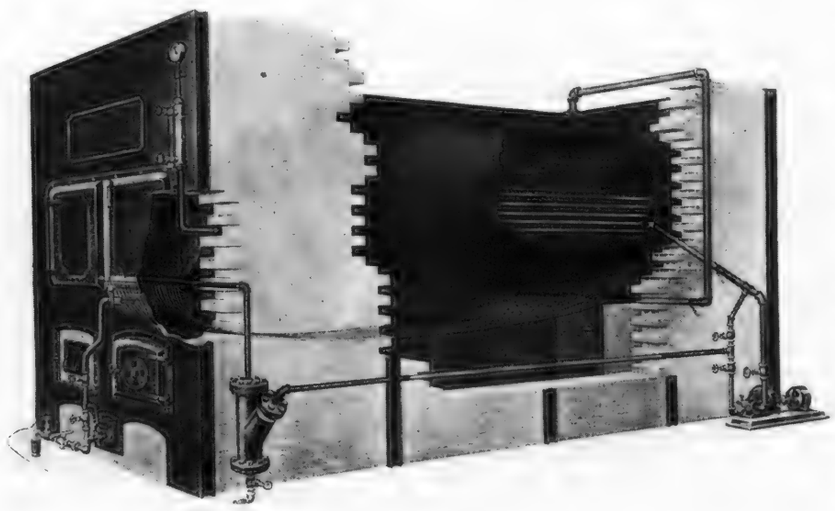
BEAVER THERMOCRETE, described as a "poured-in-place" multicell mineral for insulating, sound-proofing, and fire-saving building construction, is described by the Beaver Products Co., Inc., Buffalo, in a series of circulars and data sheets issued in loose-leaf form. The discussion is divided into six parts, including a general description of heat transmission, terms used, and comparative test figures of different insulating materials; a discussion of Thermocrete cellular gypsum insulation; a description of home Thermocrete, which is a light-weight cellular gypsum for application to various types of frame construction; a description of general Thermocrete, a heavy-weight cellular gypsum for insulating roof decks and for use as a light "fill" in place of cinder or stone concrete; and data on fire tests of various types of insulating material. Thermocrete, in the cellular gypsum form, is produced by adding to commercial gypsum certain chemicals. The product is light in weight and is said to be firesafe, decay and vermin proof, and also acts to prevent the passage of sound. By varying the amounts and kinds of chemicals used, the weight per cubic foot of Thermocrete can be altered to suit the use to which it is to be put. According to tests quoted home Thermocrete has a heat conductivity of 0.347 B.T.U. Included in the circular are directions for estimating the cost of installation as well as the heat savings possible with different applications of Thermocrete. Numerous details of application are given.

NEW LIFE IN OLD BOILERS AND LONG LIFE TO THE NEW is the title of a circular issued by the LaMont Corp., 200 Fifth Avenue, New York, featuring the LaMontube Screen. This device is designed as an adjunct to horizontal return-tubular boilers, and it is stated that an appreciable additional steam output capacity can be acquired without additional floor space.

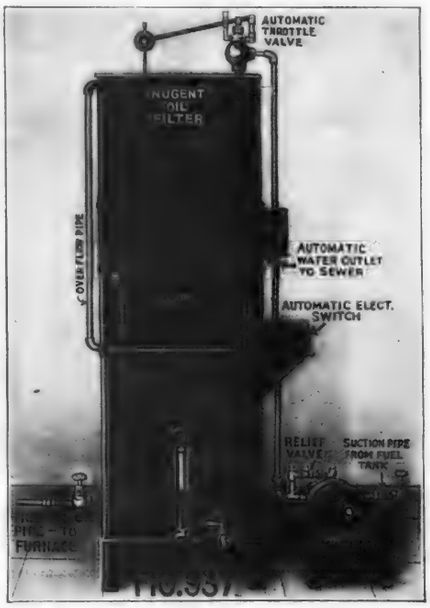
"LaMontubes" consist of parallel water tubes extending from top to rear, immediately over the combustion chamber, terminating in headers at the front and rear ends of the boiler. Forced water circulation is provided by an electrically-driven, centrifugal pump consuming about ¼ H.P. This forced circulation makes it possible to utilize very small, flexible tube elements. The "La Montube" equipment serves the same purpose as any water wall, making full use of the radiant heat of the fire, permitting high furnace-temperatures, with relatively low brick-work temperatures, and at the same time increasing the circulation in the boiler due to the water and steam entering the boiler at high velocity.

The circular cites an example of the installation of "LaMontube" in the plant of a worsted mill in New Jersey, oil being the fuel. The tubes added nearly 100 sq. ft. of heating service to the boiler and were subjected to the direct action of the oil-burner flame. Before the installation of the screen, it was said to be impossible to operate the boiler above 150 H.P. with safety and the normal load carried was 130 B.H.P. Since the installation of the screen, it has been found possible to operate with a total load of 265 B.H.P., 195 coming from the boiler and 70 from the screen and a normal load of 220 B.H.P. is easily maintained, this being an added steam production of about 70%. The application of "LaMontubes" is not confined to horizontal-return tubular boilers. They can be used as water walls, in any position desired, and offer an interesting solution of the problem of getting more horsepower out of a boiler that is inadequate.

M-D CO. PUMPING EQUIPMENT is described in a catalog issued by Mechanical Devices Co., Aurora, Ill. This line is designed for oil burners, for house service and other specialized uses as a small-capacity pump, hand or motor driven.



"LaMontube" Screen Installed in Horizontal Return Tubular Boiler

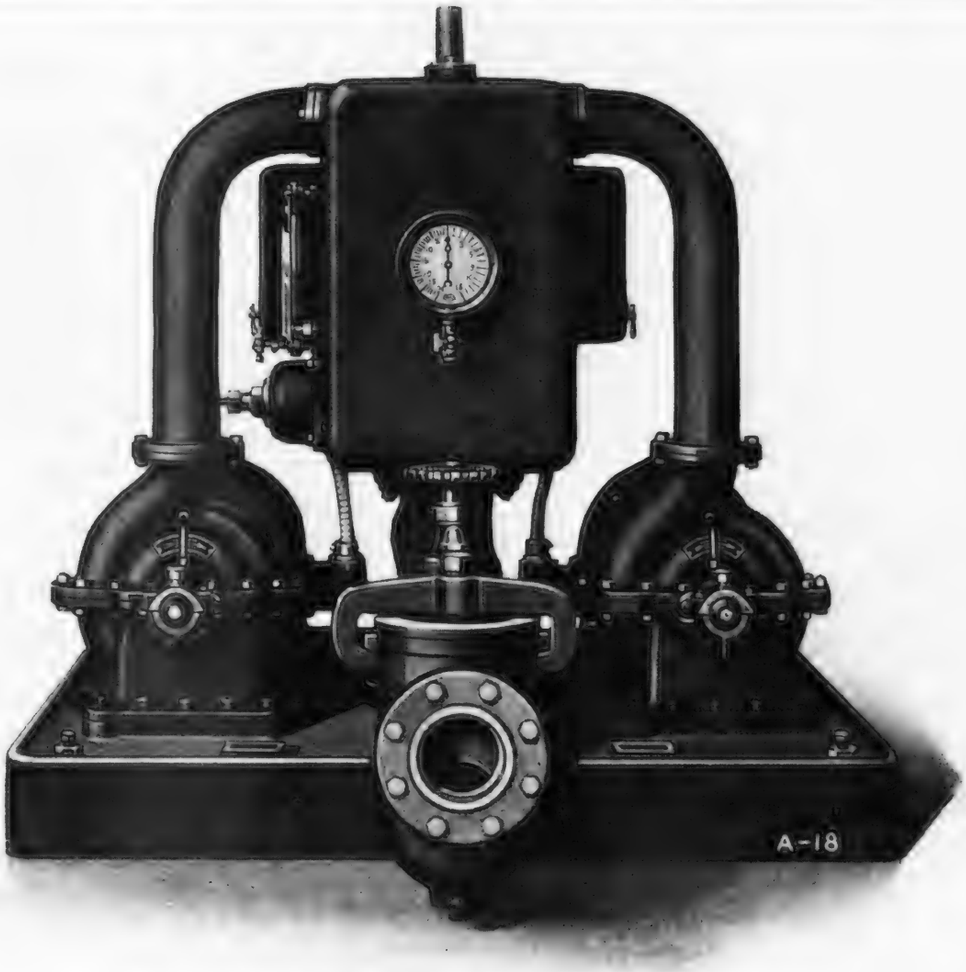


Filter for Cleaning Crankcase Oil

NUGENT CONTINUOUS AND AUTOMATIC FUEL OIL FILTER is described in a circular issued by Wm. W. Nugent & Co., 410 N. Hermitage Ave., Chicago. This filter is particularly adapted to the filtration of crankcase oil taken from automobiles. The filtration starts and stops automatically as the oil is cleaned and the water, dirt, grit, and carbon are extracted from the oil. If one of the filtering elements needs cleaning, a bell is rung automatically. The cleaning operation takes only about two minutes for each filtering unit, and can be carried out without interrupting the operation of the filter. The filters can be had to handle any reasonable quantity of oil.

THATCHER GOTHIC RADIATORS are described in a small pamphlet issued by the Thatcher Co., Newark, N. J. This is the new tubular type, and is made in 20, 26, 32, and 38-in. heights with three and four tubes; in 20, 23, 26, 32, and 38-in. heights with five tubes; and in 14, 18, 20, 26, 32, and 38-in. heights with six tubes. Due to the thin wall and new design, this radiator in exceptionally efficient. Ornamentation has been reduced to a minimum, making the radiator easy to keep clean. Gothic wall radiators are made in 3, 4, and 5 tube elements without leg sections. The ratings conform to those announced by the leading radiator manufacturers as of January 1, 1928.

KEWANEE BOILERS are the subject of a large display circular coming from the Kewanee Boiler Co., Kewanee, Ill. This broadside features Kewanee boilers installed in large apartment houses, using illustrations of the buildings, of the boiler rooms and of letters of recommendation from purchasers. It is stated that the largest co-operative apartment building in Chicago, the Sheridan-Brompton Apartments, is heated with three No. 423 Kewanee firebox boilers, each having a rated capacity of 25,000 sq. ft. of radiation.



Duplex Unit—*End View*

The AMES Pump

A definite Advance in Vacuum Heating Equipment

Guaranteed for THREE YEARS

ENGINEERING skill has achieved in the Ames Pump a remarkable combination of the highest efficiency with extreme simplicity.

Smart in appearance, compact, silent in operation. Requires no adjustment.

Handles returns regardless of temperature, without vapor binding or feed water loss. It puts an end to pump troubles.

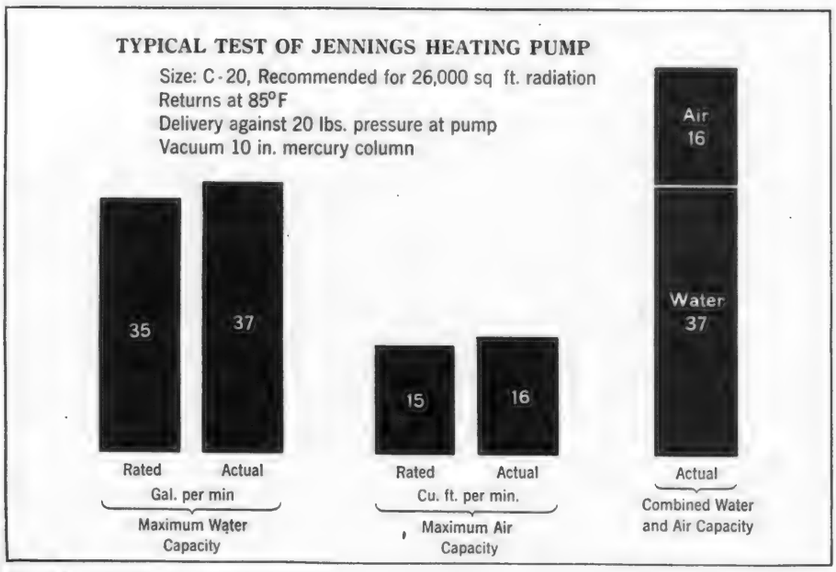
Write for Bulletin 52-C4

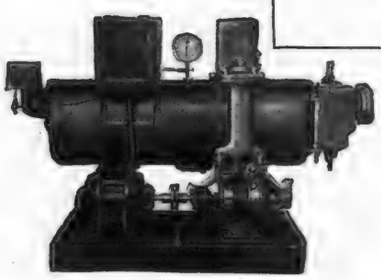
AMES PUMP COMPANY, Inc.

Division of STATEN ISLAND SHIPBUILDING CO.

90 West Street New York, N. Y.

DISTINCTIVELY DIFFERENT





Motor-driven Jennings Vacuum Heating Pump with Returns Tank. Supplied in standard sizes up to 300,000 sq. ft. equivalent direct radiation; for either continuous operation or with automatic control.

Combined water and air capacity is what counts—*not* capacity to pump water or air alone

Test any Jennings Vacuum Heating Pump for maximum water capacity only. Then for maximum air capacity only. And finally for combined water and air capacity under the specified conditions of vacuum, pressure and temperature for which the particular size of Jennings unit is recommended.

Two things will at once be apparent. That the actual maximum water and air capacities of the Jennings Pump are the same as, if not greater than, the published rated capacities.

And further,—that the actual combined water and air capacity also is fully as great as the combined rated capacity.

It is this *combined capacity in actual service* which affirms the efficiency of the Jennings Pump. And identifies its exceptionally economical performance in removing condensation and air from the return line heating system.

NASH ENGINEERING COMPANY

81 Wilson Road **SO. NORWALK, CONN.**

Branch Sales Offices: Atlanta, Birmingham, Boston, Buffalo, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Los Angeles, Louisville, Ky., Memphis, Miami, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Seattle, Washington, D. C. **In Canada:** Montreal, Toronto and Vancouver. **European Offices:** London, Eng., Norman Eng. Co.; Brussels, Belgium, and Amsterdam, Holland, Okura & Co., Ltd., Tokyo, Japan; Oslo, Norway, and Stockholm, Sweden, Lorentzen & Wettre.

Jennings Pumps

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

Trade and Miscellaneous Notes

Coming Events

April 17-19, 1928. Annual convention of the National Warm-Air Heating and Ventilating Association in Chicago. Headquarters at the Stevens Hotel.

May 7-10, 1928. Thirty-second annual meeting of the National Fire Protection Association in Atlantic City, N. J. Headquarters at the Hotel Chalfonte-Haddon Hall.

May 7-10, 1928. Annual meeting and exhibition of the Natural Gas Department of the American Gas Association in Dallas, Tex. Headquarters for meeting will be at the Fair Park Auditorium, and the exhibition will be held in the Manufacturers Building.

May 14-17, 1928. Spring meeting of the American Society of Mechanical Engineers in Pittsburgh, Pa.

June 4-7, 1928. Thirty-ninth annual convention of the Heating and Piping Contractors National Association in Philadelphia, Pa. Headquarters at the Bellevue-Stratford Hotel.

June 12-15, 1928. Annual convention of the National District Heating Association at Atlantic City, N. J. Headquarters at Ambassador Hotel.

June 26-29, 1928. Semi-annual meeting of the American Society of Heating and Ventilating Engineers at West Baden, Ind. Headquarters at West Baden Springs Hotel.

August 20-September 3, 1928. Regional meeting of the American Society of Mechanical Engineers at the Twin Cities, and a tour of the Great Lakes.

September 17-20, 1928. Second national meeting of the Fuels Division of the American Society of Mechanical Engineers in Cleveland, O.

October 8-12, 1928. Tenth annual convention of the American Gas Association in Atlantic City, N. J.

Miscellaneous Notes

February building operations, reported by the F. W. Dodge Corporation, show an increase of 18% over February, 1927, and a 9% increase over January of this year. The figures for the 37 states east of the Rocky Mountains were $465,331,300, this being the highest February contract total ever recorded for these states. Analysis of the February building record shows that 51% of all construction was for residential buildings, 13% for public works and utilities, 12% for commercial buildings, 8% for social and recreational projects, and 7% for industrial buildings.

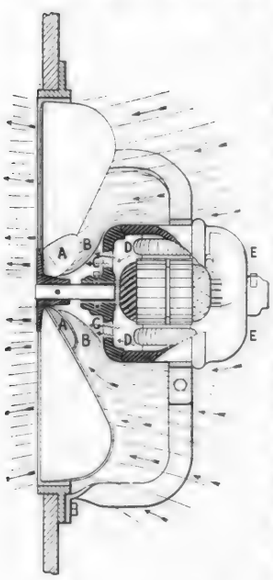
In New York State and northern New Jersey contracts amounted to $139,071,700, this figure representing the highest February on record in this territory. It was 34% over the amount reported in February of last year and 6% ahead of the record for January of this year. This probably was due to a hotel contract for $22,000,000. In the New England States contracts amounted to $22,981,300, being the second highest February contract total on record for this district. Figures show an increase of 3% over the February, 1927, total, but 36% below the January, 1928, record.

A record February was reported for the Middle Atlantic States, contracts amounting to $46,648,200. This figure was a 13% increase over February of last year, but a decrease of 9% from January's record. In the Pittsburgh district contract figures were $41,090,500, which represented an increase of 45% over January of this year, but was a drop of 28% from the total for February of last year. The largest February on record was reported for the Central West, the figures amounting to $153,082,100, representing a 34% increase over January and a 40% increase over the February, 1927, total.

AUTOVENT

VENTILATION HEATING

REGISTERED AUTOVENT.



Fan Motor Cooling and Protection:—

Air passed through the motor to cool it would cause rapid deterioration of motor windings. In cooling the Autovent propeller fan motor, the air is not passed directly through it, but instead, the principle of radiation cooling is utilized. This cooling is accomplished by patented Centripetal Vanes on the fan wheel hub. When fan is in motion, then vanes cause air currents to converge and carry away the heat from the fan end of the motor.

The exposed end of the motor is securely closed by removable inspection covers. With no current of air passing through the motor there is no danger of windings becoming contaminated or corroded.

A protected motor will always give satisfaction.

Built for Years of Service:—

When we built the first Autovent Unit Heater four years ago, we followed specifications that provide for many years of service under hard usage. There are many more years of service in the Autovent Units made four years ago, and it is a great satisfaction to know that not one has been reported unsatisfactory.

The reasons are correct design, rigid construction and use of best materials. Features are: Heavy-duty motor—tapered discharge—adjustable diffusers—extra large air-pressure chamber.

Don't hesitate about figuring Unit Heater jobs. Remember that we have a staff of engineers constantly at your service. Write to us for ideas and suggestions—no obligations.

Engineers in all principal cities.

AUTOVENT FAN & BLOWER CO., 1805-1827 No. Kostner Ave., CHICAGO

In the Northwest contracts amounted to $2,199,300, this figure being a decrease of 29% from the amount reported for January and a 23% decrease from the February total of last year. Contracts amounted to $38,949,600 in the Southeastern States, showing a loss of 17% from the total of January of this year and a 16% decrease from February of last year. For Texas a record February has been reported, contracts amounting to $21,308,600, representing a 28% increase over the January, 1928, total, and 73% over the February, 1927, record.

Fuels Division of the A.S.M.E. will hold the second national meeting in Cleveland, during the week of September 17. Col. Elliott H. Whitlock has been appointed chairman of the special committee to conduct the meeting, and associated with him are P. V. Fraser, Theodore Maynz, John Wolff, F. H. Vose, H. K. Kugel. The technical program will be under the general guidance of Victor J. Azbe, chairman of the Fuels Division.

Central Supply Association will hold its next meeting at the Palmer House, Chicago, April 11-12. This meeting has been delayed so as to allow additional time for the Harvard Bureau of Business Research to compile a summary of information received from members regarding the 1927 cost of doing business.

National Industrial Conference Board, Inc., 247 Park Ave., New York, has issued a bulletin stating that employment and activity in the manufacturing industry of the United States have been on the increase since November, 1927, as indicated by the January, 1928, returns from about 2000 manufacturing plants reporting monthly to the board. These plants, both large and small, are located throughout the country, and represent 25 different divisions of manufacturing. Inasmuch as mid-winter is a quiet period in many industries, states the board, seasonal influences should produce further improvement in February and March employment when the data for these months become available.

Second Annual Technical Conference of the Massachusetts Association of Master Plumbers was held at the Massachusetts Institute of Technology, Cambridge, Mass., February 15-16, under the auspices of the Department of Civil and Sanitary Engineering. In addition to the lectures on various phases of plumbing, Prof. James Holt discussed the proper figuring of radiation and the sizing of boilers. The conference was attended by 400 contractors.

Charles T. Gibson, of Portland, Ore., was a speaker at the meeting of the Pacific Northwest branch of the Associated General Contractors of America, held in Spokane, Wash., February 11. His talk was confined chiefly to "Certified Heating," and pointed out that "competition in the heating industry in Oregon has led to such poor installations that state regulation of heating is threatened." Mr. Gibson stated that, in Portland, "Certified Heating" has been adopted as a means of protecting the heating concerns and the public.

The Engineering Society of Japan announces that a World Engineering Congress will be held at Tokyo for two weeks during October, 1929. An invitation is extended to governmental departments, universities, institutes, associations and individuals collaborating in engineering. Correspondence should be addressed to the society at Marunouchi Bldg., Tokyo.

Carnegie Institute of Technology, Pittsburgh, announces that courses in plumbing and welding are receiving special attention in the plans for the coming summer session. The College of Industries will give six-weeks' courses, from June 25 to August 3, in plumbing and oxy-acetylene welding, under the direction of the department of plumbing, heating and ventilating.

American Society of Mechanical Engineers has completed arrangements for a tour of the Great Lakes, in connection with the Regional Meeting at the Twin Cities, to occupy two weeks, beginning August 20, from Buffalo, and ending at Buffalo on September 3 (Labor Day). Entertainment en route is being planned for by society chapters at Detroit, Duluth, Winnipeg, and the Twin Cities.

National Foreign Trade Council announces the Fifteenth National Foreign Trade Convention to take place at Houston, Tex., April 25-27. The principal

OIL BURNER GULF COMPANY

Makes Profit for Dealers

WHEN a dealer secures the Gulf Oil Burner Franchise, he has a valuable and sound merchandising proposition —sound because of years of proved good selling—sound because of the excellent performance given by Gulf Oil Burners in all types of heating plants—sound because the Gulf Oil Burner has behind it the engineering knowledge, manufacturing skill and merchandising ability of the Gulf Organization.

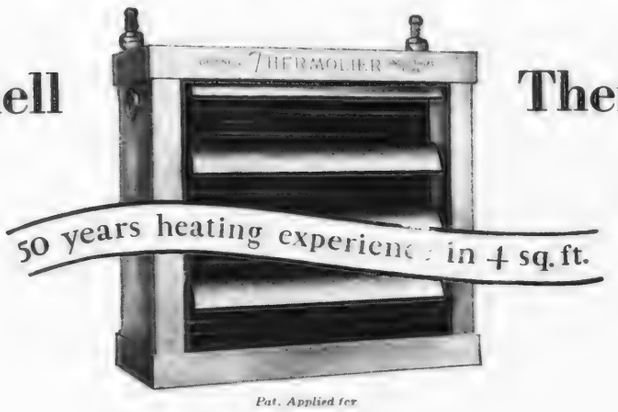
This valuable franchise, including unusual co-operation and sales helps, is still available to a small number of dealers whose qualifications meet our requirements.

Write now for full details.

The Gulf Oil Burner Co.

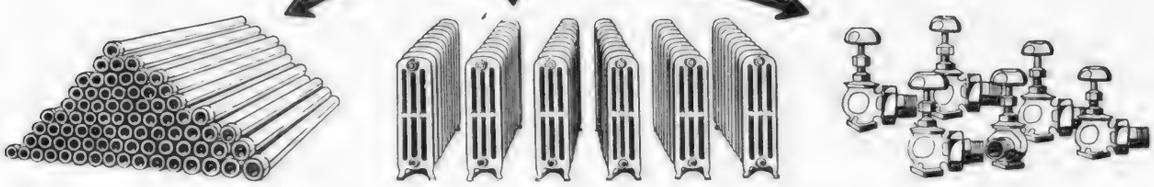
Dept. D-4, 1627 Chestnut Street, Philadelphia, Pa.

Grinnell Thermolier



Pat. Applied for

When 200 pounds does a 4,000 pound job



WHEN you decide to displace 4000 pounds of pipe coils and cast-iron radiation with a 200 pound unit heater you want to be sure the displacement is permanent.

The principle of unit heating is so revolutionary in accomplishment that you must insist, when adopting that principle, on the unit which beyond everything is rugged, dependable and practical.

In Thermolier, Industrial Type, Grinnell offers a unit with fourteen features, which 50 years of practical heating experience told our engineers were essential. Before you start to revolutionize your heating methods send for a booklet which compresses this vital data into a few pages of clear-as-crystal facts. Then you can act with your eyes open.

GRINNELL COMPANY

Executive Offices: Providence, R. I.

Branches in all Principal Cities

14 Points of Superiority

GRINNELL COMPANY, INC.
208 W. Exchange St., Providence, R. I.

I want to read more facts about the Thermolier. Send along the booklet.

Name_____

Address_____

City_____

theme of the convention will be trade with Latin America.

Plumbing and Heating Industries' Bureau, Evansville, Ind., is calling the attention of master plumbers and heating contractors to its national advertising campaign, beginning April 28, in the interest of a wider use of plumbing and heating equipment. Commencing with the April 28 issue of the *Saturday Evening Post* and continuing at intervals of four weeks, the story of better sanitation and heating equipment will be told in the form of page advertisements. In connection with the campaign, contractors of both industries are urged to dress up the windows of their stores to hook up with the campaign and to use space in the local newspapers to run tie-up advertisements, which have been prepared by the bureau.

International Press Exhibition will be held in Cologne, from May to October, 1928. One important group of the American Exhibit will be devoted to the American periodical. It is intended, as stated by the general management of the exhibition, "to give the world an impressive picture of the educational and economic importance of the press in all its aspects, and thereby awaken and deepen the comprehension of the huge task of the press in international life." The exhibition grounds are to be on the beautiful, historic River Rhine. Correspondence may be addressed to the American Committee, International Press Exhibition, 461 Eighth Ave., New York.

Ernest Szekely has returned to the practice of consulting engineering, resigning as chief engineer for Drying Systems Company. His office is at 500 B.R.T. Building, Cleveland, O.

Dr. H. N. Davis Heads Stevens Institute

Announcement has been made that Dr. Harvey Nathaniel Davis, professor of mechanical engineering at Harvard University, has been elected president of Stevens Institute of Technology, at Hoboken. Dr. Davis will assume his new duties September 1. He succeeds the late Alexander C. Humphreys, who resigned last June upon the completion of a quarter-century of service for the institute. Dr. Humphreys died last August.

Changes of Address

Pyramid Iron Products Corp., New York, has moved its offices from 136 Liberty Street to 230 East 41st Street.

J. L. Mott Co., Inc., New York, the new consolidation of the former J. L. Mott Company, the Laib Company and the Columbia Sanitary Mfg. Company, will move its New York offices and showrooms on May 1, from Fifth Avenue and 17th Street to a new building at 369 Lexington Avenue, at 41st Street, to be known as the Mott Building.

Manufacturers' Notes

Burnham Boiler Corp., Irvington-on-Hudson, N. Y., announces that William E. Kreuger, formerly with Hart & Crouse Company, has joined the sales force of the company to cover the northern New Jersey territory.

Reading Iron Co., Reading, Pa., has appointed P. P. Barrett representative for the company in the Cincinnati territory. Mr. Barrett's headquarters will be in Indianapolis, Ind.

Landon Radiator Co., Inc., Buffalo, N. Y., has appointed William S. Newkirk manager of the New York office. Mr. Newkirk was for 20 years vice-president of the Niagara Radiator & Boiler Company, joining the forces of the National Radiator Corporation as special representative when his company merged with the National interests.

York Heating and Ventilating Corp., Philadelphia, announces several additions to the sales staff of the company in the East. W. H. Walker has joined the New York office sales staff; H. V. Herd is now manager of the Cleveland office and is occupying a position similar to that which he held with the American Blower Company; H. B. Orr, formerly with the Armstrong Cork Company and the Celotex Company, is located at the Pittsburgh office.

BUHL LAND COMPANY
GRISWOLD AND CONGRESS STREETS
DETROIT
June 7, 1927
American Temperature Indicating Co.,
1017 Summit
Toledo, Ohio
Attention Mr. D. B. Noyes
Gentlemen:
Having used your Caliscope instrument in the Buhl Building for a period of two years, or through three heating seasons, I am pleased to advise that it has been the means of operating our heating system very efficiently.
We have twenty-five stations that indicate temperatures to the engineer in the basement, who in return regulates the steam pressure to supply sufficient heat and avoid overheating, which is very expensive.
I might say that with the Compound Orifice equipment installed in the heating system and the intelligence furnished by the Caliscope, we are able to maintain a uniform temperature throughout the building. This is evidenced by the charts taken by recording thermometers, as shown in the inclosed phamplet "An Experience with the Orifice Method of Steam Distribution" which was presented before the National District Heating Association on May 14, 1927.
Yours very truly,
BUHL LAND COMPANY
Operating Superintendent
VWH:KMB
KNOW THE TEMPERATURE OF ALL ROOMS
AT ONE CENTRAL POINT

Note the above letter showing how successfully the Caliscope is being used in the Buhl Building in Detroit, Michigan.

Modern ventilation as it is understood today, necessitates accurate control of temperature and humidity and consequently requires accurate and convenient determination of same. The Caliscope makes this possible. Let us send complete information.

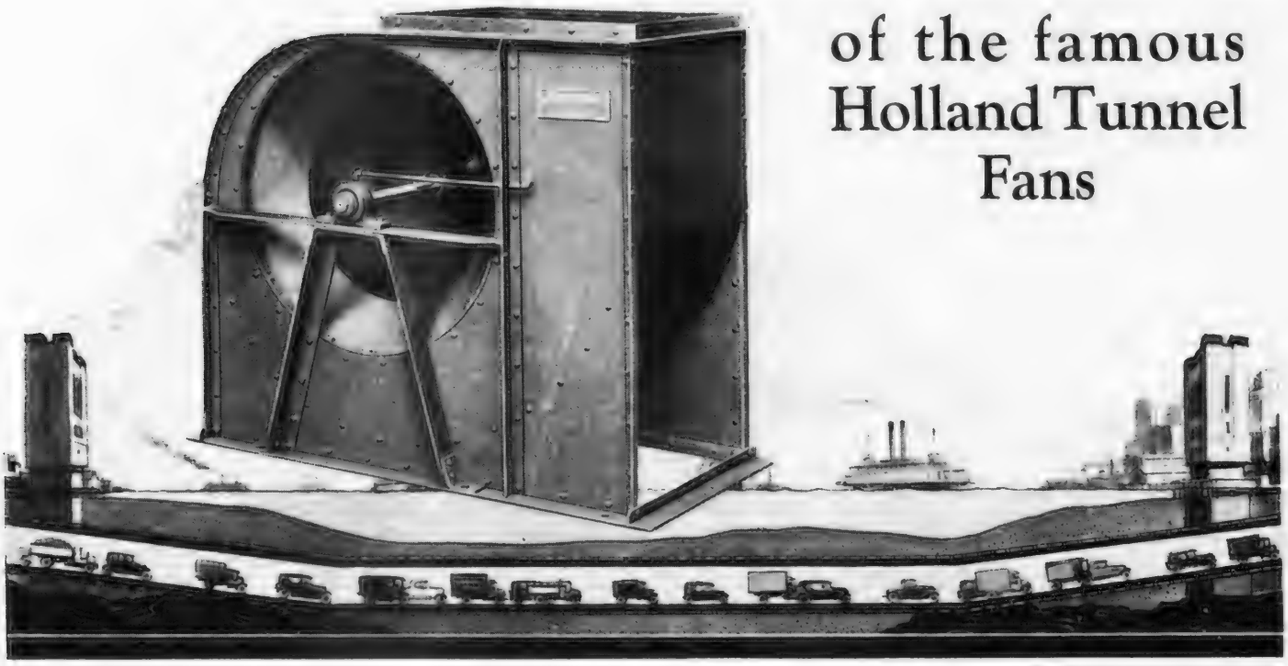
THE AMERICAN TEMPERATURE INDICATING CO. - TOLEDO, OHIO

The New "Sturdivane"

- - - same superior operating characteristics

- - - same low power consumption

of the famous Holland Tunnel Fans



Extremely low cut-off velocity—quiet as a slow speed fan

THE "Sturdivane" brings new efficiency and economy to ventilating fan operation.

Built for general use, this sturdy, high speed ventilating fan is patterned after the giant Sturtevant fans which ventilate the Holland Vehicular Tunnels.

All the knowledge and developments in design that resulted from the months spent in designing, building and testing the Holland Tunnel Fans are incorporated in the "Sturdivane."

Here are some of the "Sturdivane" features worth investigating— 1. Extremely low cut-off velocity. 2. Quiet as a slow speed fan. 3. Has a self-limiting horse power characteristic. 4. Cuts operating costs 25 to 30%. 5. Low initial cost. 6. Low transportation cost. 7. Low installation cost. 8. Ball bearing equipped. 9. Saves 20% or more on direct connected motor costs.

Write to the nearest Sturtevant office for a complete description of this new fan.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Buffalo	Chicago	Dallas	Hartford	Los Angeles	Pittsburgh	St. Louis	Seattle
Birmingham	Camden	Cincinnati	Denver	Indianapolis	Minneapolis	Portland	Salt Lake City	Washington
Boston	Charlotte	Cleveland	Detroit	Kansas City	New York	Rochester	San Francisco	

Canadian offices at: Toronto, Montreal and Galt, Ontario, also Agents in principal foreign countries

Sturtevant

REG. U. S. PAT. OFF.

VENTILATING, HEATING, AND POWER PLANT EQUIPMENT

Pacific Boiler Corporation is the new name of the Pacific Steel Boiler Corp., Waukegan, Ill., which recently was purchased by the United States Radiator Corp., of Detroit. The concern has been incorporated under the laws of Michigan, but headquarters will remain in Waukegan. Officers of the corporation are: President, O. T. Nelson, formerly of the Pacific Steel Boiler Corporation; vice-president in charge of sales, J. R. Collette, formerly of the same company; vice-president in charge of production, J. F. McIntire, of the United States Radiator Corporation; secretary and treasurer, W. E. Mosher, of the United States Radiator Corporation. Directors: Chairman, H. T. Cole, president of the United States Radiator Corporation; J. F. McIntire, J. R. Collette, E. E. McNair and V. A. Vesper. The sales organization of the corporation remains the same.

The Federal Gauge Co., 564 West Adams St., Chicago, Ill., announces that The Mercoid Corporation will be the selling name under which the merged interests of The Federal Gauge Company and the Arcless Contact Company will operate.

National Plumbing Supply Co., 2121 Olive St., St. Louis, Mo., extends a cordial welcome to the heating and plumbing trade in St. Louis and surrounding territory to visit and inspect its new quarters. The company will operate as wholesalers in the distribution of a full line of heating and plumbing supplies.

Officers of the new company are: President, Jere F. Sheehan, who formerly was connected with the heating and automatic sprinkler departments of Thomas J. Sheehan Company; vice-president and general manager, Clarence C. Bartling; secretary, Frank N. Dutton, formerly of the Wolff Mfg. Company.

Hoffman Specialty Co., 25 West 45th St., New York, announces the following changes in its personnel: H. E. Whyte, formerly in the Cleveland district, has been transferred to Montreal, Canada, to travel the eastern part of the dominion, with headquarters at Montreal; I. H. Vogel, formerly at Buffalo, will succeed Mr. Whyte in the Cleveland district, and can be reached at the Cleveland Athletic Club; A. K. Tinker has been transferred from Philadelphia to Buffalo, with headquarters at the Hotel Touraine, Buffalo. Potter Bowles is now sales representative in Southern California, with headquarters at 2704 South Hill St., Los Angeles. Charles W. Stewart, Frank H. Gaylord and William G. Boales have been appointed as assistant sales managers and will continue to act as zone supervisors for the company. M. C. Gillett, formerly president of the Spencer Heater Company, has joined the Hoffman company as assistant sales manager and zone supervisor of the South Atlantic States, including Philadelphia.

Evins F. Glore & Son, Inc., Grand Central Terminal, New York, has been appointed exclusive representative of the "X" Laboratories, New York, in the Brooklyn and Long Island territories. The Glore company will sell the boiler liquid manufactured by this company only to the wholesale trade.

S. S. Spencer Co., Minneapolis, Minn., opened its new display rooms February 29 to a large gathering of heating and plumbing contractors, architects and builders. The new building is at 204-210 East Lake Street. The Spencer company has been appointed distributors, for the Northwest, for National Radiator Corporation's products. Among the officers who received the guests were: S. S. Spencer, president; A. J. Koch, secretary and treasurer; George Schultz, sales manager; and C. L. Davis, manager, heating department.

Bushnell-Felton, Inc., 61-63 Carroll St., Buffalo, N. Y., has been formed as successor to Clarence E. Bushnell & Son, by Carlos N. Bushnell and Wilbert H. Felton. This company will be sole distributors, in western New York, for the Chicago Pump Company and the Illinois Engineering Company. Mr. Felton was formerly assistant sales manager and engineer of the Niagara Radiator and Boiler Company.

Autovent Fan & Blower Co., Chicago, Ill., has inaugurated a department to take care of its unit-heater business, which has developed to a point where it is necessary to handle it separately from the fan and blower business. H. C. Shilling has been placed in charge of this department.

The Automatic Air Filter that is 100% Automatic

The ACE Automatic, Self-Cleaning Air Filter eliminates the human element from filter operation *completely.* And by "completely" we mean just that. In the first place, the ACE cleans the air with an efficiency as near 100% as can be approached by any practical air cleaning device, due to the patented two-stage filter media. Next, it automatically washes, at regular intervals, the accumulated dirt from the filtering surfaces. Simultaneously with the self-flushing operation it ejects the sediment from the reservoir into a cloth basket. About once a month this basket is dumped. It can be emptied as easily as a waste paper basket, without soiling the hands. This basket requires no washing. There are no strainers to clean, no bulky pans to empty, and no other undesirable cleaning jobs of any kind.

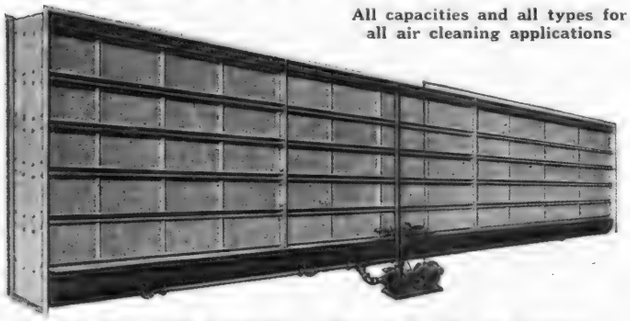
This complete freedom from manual cleaning not only reduces the cost of attendance to a negligible quantity, but also insures continuous operation at highest efficiency.

Is it any wonder that ACE Filters are being specified with increasing regularity for all kinds of applications, by Architects, Engineers, Contractors, Business and Industrial Executives.

Write for complete details. They are convincing.

ACE Automatic, Self-Cleaning AIR FILTER

All capacities and all types for all air cleaning applications



Typical large ACE installation. One of 5 units at Cincinnati Masonic Temple. Total cap. 280,000 C.F.M. ACE Filters are cleaning the air in hospitals, schools, office buildings, hotels, clubs, theatres, stores and industrial plants all over the country.

General Air Filters Corp.
Division The W. B. Connor Co. Inc.
369A Lexington Ave., New York

Manufacturers of Air Conditioning Equipment, Air Filters, Air Washers, Spray Nozzles

Haynes Selling Co., Inc., 2013 Sansom St., Philadelphia, Pa., announces that the company will be represented in Baltimore by Arthur E. Train, 2116 Mt. Holly Street, who will handle Hoffman specialties, Marsh packless valves, McDonnell and Miller water feeders, Taco heaters, Vinco, and Circulair.

American Radiator Co., New York, N. Y., has appointed Walter F. Johnson as manager of the Buffalo branch of the company. Mr. Johnson has been a member of the company for the past 20 years and recently was assistant manager at the New York headquarters.

Taco Heaters, Inc., 342 Madison Ave., New York, has taken over the business formerly conducted by Thermal Appliance Company, Inc. The management which has directed the business of the Thermal Appliance Company will continue to conduct the new company, according to an announcement by Elwood S. White, president.

The Heating Equipment Co., Oliver Bldg., Pittsburgh, Pa., has been formed by Samuel Harper and James L. Shaughnessy. The company will handle the Hart-Crouse boilers, O. E. Frank Heater and Engineering Company water heaters, Universal Smokeless Boiler Company's gas boilers, and Eureka Brass Mfg. Company's valves. Mr. Harper formerly covered the Niagara Radiator & Boiler Company's Pittsburgh territory, and Mr. Shaughnessy was in charge of the heating department of the Anchor Sanitary Company in Pittsburgh.

Semler Co., Jeannette, Pa., has acquired the assets and properties of the Pittsburgh Engineering Co., of Jeannette, and will conduct the business as the Semler Company. The Pittsburgh company has manufactured cast-iron steam and drainage fittings, flanges and flange unions.

Gorton Heating Corp., formerly Gorton & Lidgerwood Co., 96 Liberty St., New York, has enlarged the territory of Martin F. Cuff to include Essex, Morris and Somerset Counties. Mr. Cuff's headquarters are 106 Summit Road, Elizabeth, N. J.

Charles B. Scott Co., 119-123 Franklin Ave., Scranton, Pa., has been appointed sales agent for the Gorton single-pipe vapor heating system in northeastern Pennsylvania.

Weil Pump Co., Chicago, announces the appointment of G. A. Steege, formerly instructor in the Coyne Electrical Schools, Chicago, and president of the Steege Electric Company, as advertising and office manager of the company to succeed B. R. Dardick, who has joined the Gerlach-Barklow Co., Joliet, Ill., as production manager.

Evins F. Glore & Co., Inc., Grand Central Terminal, New York, has opened a branch office in the Guarantee Industrial Bldg., 2401 Chestnut St., Philadelphia. Frank A. Yhost, formerly with the Abram Cox Company, has been appointed manager of the branch with territory as far south as Virginia, including the eastern section of Pennsylvania. The company will distribute through the wholesale trade products of W. A. Russell & Company, Belknap Mfg. Company, and also the boilers made by the Glore company.

Employees Take Over Wolff Company

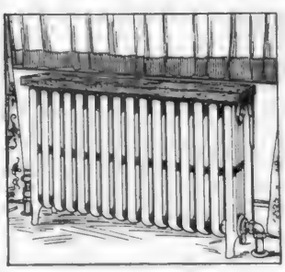
Following the tendency of the day for employees to share in the control and management of business, 35 department heads, executives and foremen of the Wolff Company, a $7,000,000 plumbing fixture corporation, founded in Chicago in 1885, have taken over the business. Gradually every member of approximately 1000 employees will be given an opportunity to share in the profits of the company, in addition to their daily wage.

William J. Woolley, president of the company and formerly secretary-manager of the National Trade Extension Bureau, is responsible for the adoption of the employee-ownership plan. He joined the company three years ago to aid in the conduct of the business that had suffered huge losses because of the taking over of the plant by the government during the World War.

According to the Star News League of Illinois, when a reorganization was found necessary, Mr. Woolley wanted to buy the company, but lacked the capital. He talked with his associated employees and then went to see S. W. Straus, New

Modern Radiator Shields

Mean More Profit on Every Job



Besides beautifying your installation, each radiator equipped with a Modern Radiator Shield means an added profit to you as a Modern Dealer. Every radiator installation is an almost certain prospect for the sale of Modern Baked Enamel Shields and Art de Luxe Cabinets.

We can take care of any job from plain shields to complete radiator furniture, in pattern, or to match any decoration scheme. Regular stock shields have a beautiful original finish.

Radiator Shields and Cabinets are becoming very popular, and the Modern line represents a profitable business for the heating contractor. ***Write for Prices and Dealer Agreement***

Acme Radiator Shield Co., Inc.

Manufacturers of "Modern" Radiator Furniture.

48 and 50 Vine Street, Cincinnati, Ohio

E Z

RADIATOR HANGER

THESE days people ask their friends, "Will your new home have those beautiful, tube-type **legless** radiators that are so easy to clean beneath?"

Don't disappoint your customers!

Use E-Z Hangers. Complete stocks for **ALL** tube-type radiators.

Healy-Ruff Co.

772 Hampden Ave., St. Paul, Minn.

York banker, head of S. W. Straus & Company. After outlining his plan, the bankers agreed that if a group of employees would invest their savings in the enterprise, S. W. Straus & Company would supply additional funds so that the experienced employees could manage and control the business.

Associated with Mr. Woolley in the management of the company is William T. Mahoney, vice-president in charge of production, who began his career as an apprentice in a foundry. Other leading employees include Henry I. Warden, vice-president; Arthur H. Jolliffe, secretary, and O. P. Decker, former instructor in economics at the University of Chicago, treasurer.

New Branch Offices

Trane Co., LaCrosse, Wis., has opened a branch office in the Wabash Bldg., Pittsburgh, in charge of C. W. Ray, who has been transferred from the Philadelphia office.

Erie City Iron Works, Erie, Pa., has established a direct sales office at 122 South Michigan Ave., Chicago, with Charles B. Acheson as district manager, J. R. LeVally as special engineer, and D. F. Lytle as sales representative. A sub-office has been established in the Chicago district, at 511 Traction Terminal Bldg., Indianapolis, Ind., with E. J. Clerget in charge.

Spray Engineering Co., Inc., Boston, Mass., announce the opening of a branch office at 15 Park Place, New York, with C. T. Keet as district manager.

Contracts Awarded

Freyn Bros., Indianapolis, Ind., heating public schools at Fairmont, W. Va., $145,088.

American Plumbing and Heating Co., Denver, Colo., heating Veterans' Hospital at Portland, Ore., $139,653.

Zuehlke-Stoehr Heating Co., Milwaukee, Wis., heating and ventilating the Lincoln High School in Milwaukee, for $124,400.

Classified Advertising

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

SALES ENGINEER WANTED—Well-established manufacturer of unit heaters has several territories open for representation. Representatives will be given exclusive territory and operate on commission basis. Address Box 41, care of Heating and Ventilating Magazine.

HIGH SCHOOL GEOMETRY by correspondence. My seventy-five page booklet makes this subject delightful. Reasonable rates for correcting your work. Send fifty cents for booklet and instructions for study. (No stamps.) Herbert O. Barnes, Head of Mathematics, High School, 1514 W. South Grand, Springfield, Ill.

SALES REPRESENTATION—Sales engineer, Chicago territory, now handling fans and blowers, desires to add one or two additional lines, either plumbing or heating equipment. Address Box 42, care of Heating and Ventilating Magazine.

SALESMEN WANTED—College men wanted to act as salesmen for a complete line of cabinet heat units and unit heaters. Reply in detail giving experience and training. All communications held strictly confidential. Address Box 43, care of Heating and Ventilating Magazine.

SALES REPRESENTATIVES WANTED—Old established company, manufacturing high-grade vapor heating specialties, has some territories open, particularly in the West and South. This is the easiest system to sell as it is the only true single-pipe vapor system with consequent saving in installation cost. Commission basis. Lay-outs not necessary. State territory and other lines handled. All communications held strictly confidential. Address Box 45, care of Heating and Ventilating Magazine.

FOR SALE — 150 H. P. tubular Brownell boiler, first-class condition. Used only six months. Has not been used since last Hartford inspection which was approved by Oklahoma Insurance Commission for 150-lb. pressure. May be seen at South West Box Co., Sand Springs, Okla. Address inquiries to South West Box Co., Keokuk, Iowa.

SALESMEN WANTED—The manufacturer of a nationally-advertised line of gas conversion burners desires the services of two high-class men to travel in natural gas territory and contact gas companies, distributors and dealers; experience in furnaces, boilers or house-heating systems desirable; good opportunity and remuneration to right men; replies treated confidentially; give complete details in your first letter. Address Box 48, care of Heating and Ventilating Magazine.

SITUATION WANTED—A practical experimental engineer familiar with all types of domestic heating. Designer of one of leading oil burners. Can handle sales engineering or development work on any device in heating line. Address Box 47, care of Heating and Ventilating Magazine.

SUPPLY YOUR LIFE'S LUXURIES WITH TECHNICAL TRAINING!

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An unusual opportunity awaits a graduate engineer 33-40, who has proven that he is a real salesman and has a thorough knowledge of fan engineering and dust collecting. Send full particulars of education, places employed, duties, salary, etc. Replies will be treated in strict confidence. Address Box 46, care of Heating and Ventilating Magazine.

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"Every day a *good* day"
Air Conditioning

Humidification, Dehumidification
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Literature on request. Write concerning your specific problem.

The "Grand Jury" Agrees on One Point—

Sylphon TRADE MARK DAMPER REGULATORS

Made Standard Factory Equipment By 35 Leading Boiler Manufacturers

THE SYLPHON DAMPER REGULATOR with its diaphragm of supersensitiveness and great durability must be vastly superior to receive such splendid endorsement, from such authorities on efficient and economical boiler construction and operation.

Thousands of steam or hot water heating systems in use have inferior regulators or none at all. That the installation of Sylphon Damper Regulators, for steam or hot water heating systems results in uniform heating, fuel economy and the banishment of care, has been proven in countless instances.

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The ORIGINAL GENUINE SYLPHON BELLOWS

The motor element in all Sylphon Instruments is the most accurate, durable and flexible temperature control unit known to science.

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Gentlemen:

We are interested in the application of Sylphon Damper Regulator to _____

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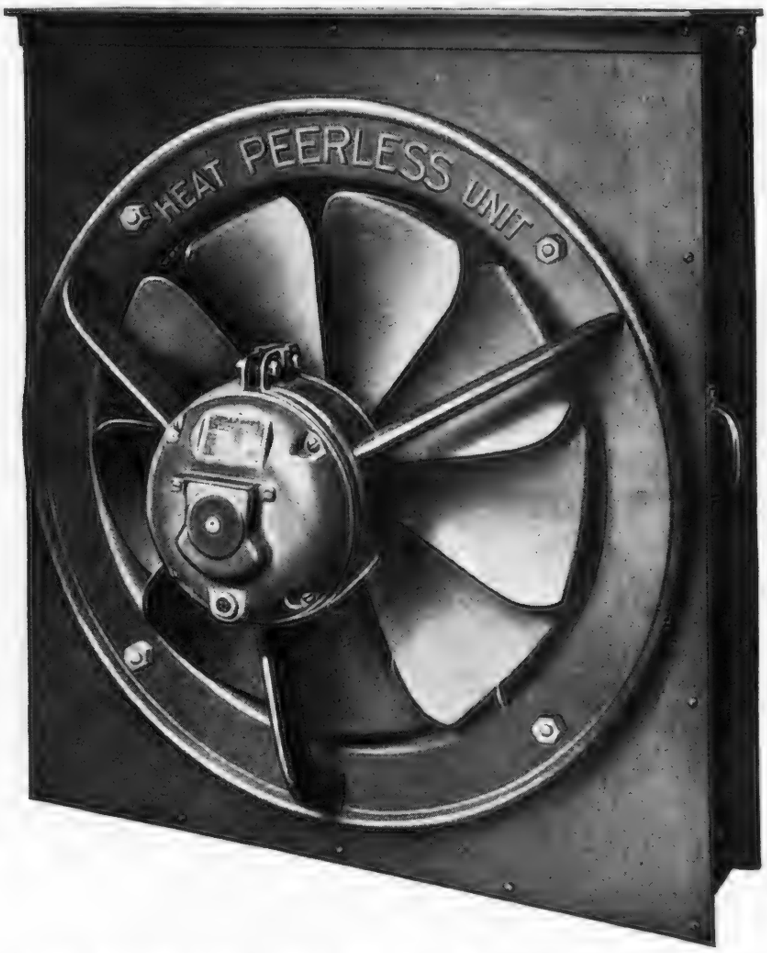
THE FULTON SYLPHON COMPANY — Sylphon — AUTOMATIC TEMPERATURE CONTROL

Quick Installations and Good Profits with Unit Heaters



THE PEERLESS UNIT HEATER comes to you all ready for steam and electrical connections. In old buildings you can use existing piping. In new buildings there will be less piping, fewer valves and fittings, less time required than for installing ordinary radiation. And when you are through your customer has a better and much less expensive heating system.

Peerless Units are built to satisfy the most exacting heating engineers, in the same shops which produce the well-known PeerVent Heating and Ventilating Unit, used in school buildings from coast to coast.

If you are interested in this up-to-date and profitable business, the booklet shown at the left will be helpful. Send for it.

Mail this! with your letterhead, please

To Peerless Unit Ventilation Co., Inc.,
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☐ Send booklet about Unit Heaters.

☐ Send your local representative.

H

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When production schedules change you find this organization especially fitted to swing into line quickly.

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"Heat with Unit Heaters"

Your Workmen Won't Mind Spring Weather Changes

Pecco Unit Heaters in your plant will quickly take care of the erratic drops and jumps to which the mercury is so provokingly addicted during the spring season. The temperature of your workrooms will be kept comfortable at all times, regardless of weather acrobatics.

Thousands of these Pecco Heaters are in use, either as regular heating equipment for entire plants or as auxiliary units to heat chilly corners, etc. Sign and send us the coupon for complete information concerning this better way to keep your workers comfortable throughout the entire year.

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Please send me a copy of booklet "Pecco Unit Heaters."

Name .....

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Because it is Simple, Rigid and easily adjusted

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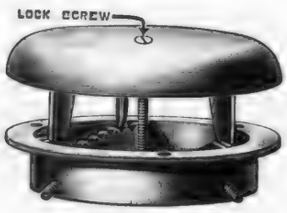

For any kind of floor

"Nu-Notch" can be installed complete just before the seats are placed, thus doing away with breakage. Attached to WOOD FLOORS by 3 lag screws in flange countersunk holes; CONCRETE FLOORS by 3 L lugs bolted to floor flange; MONOLITHIC or similar type of floors, by 3 set screws securing the collar to the sleeve.

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AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.

Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.

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CONTROL THE SPEED

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REGULATE WARM AND COLD AIR VOLUME

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VARIABLE SPEED

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Only in the THERMAL UNIT *Can You Get This Remarkable* Heating Element

THIS new and amazingly efficient radiator section is to be found only in THERMAL UNIT installations.

It is integrally cast of a patented aluminum alloy, therefore, stronger; lighter weight; and not subject to numerous conduction and penetration losses resulting from metal to metal contact. It is absolutely leak-proof. Freezing does not affect it. Heating element also furnished in Ferrous Alloy when desired.

The streamline design of the core permits freer circulation of air over element as well as the projection of large volumes of air greater distances.

Within this streamline core the circulation of steam is unobstructed and will so remain, since aluminum alloy is non-corrosive. The element operates efficiently on all steam pressures from atmospheric vapor up to 250 lbs. It is compact; safe; efficient; durable.

For further information, address Thermal Units Company (a subsidiary of the Mechanical Manufacturing Co.), Pershing Road and Loomis Street, Chicago.

Eastern Office
30 Church Street
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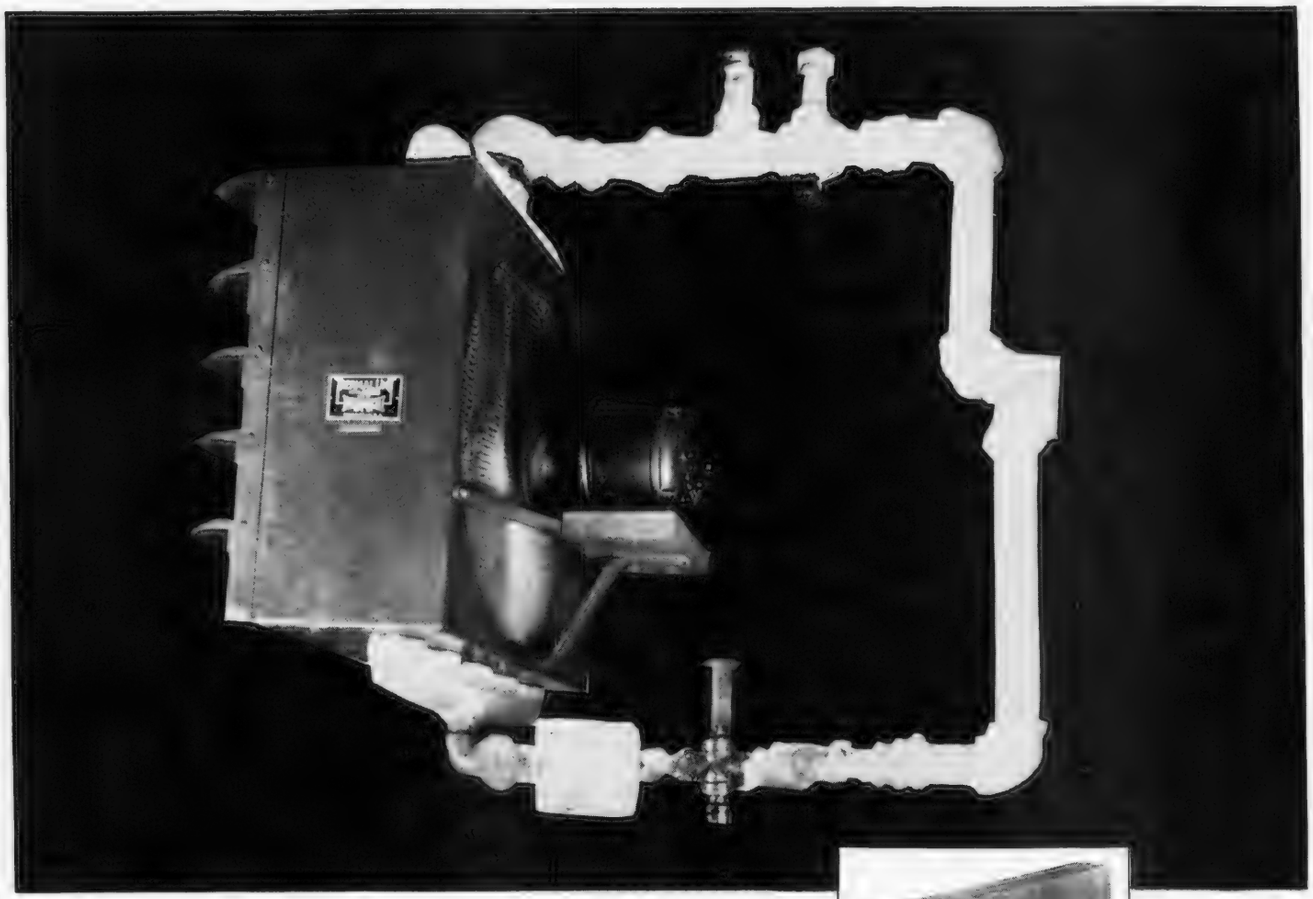
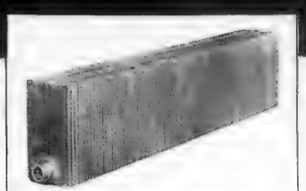
THERMAL UNITS FOR REFRIGERATION





Showing the one-piece casting of entire cooling section. There is more pure air for efficient and fast air movement, plus greater strength and leak-proof performance.

Top Efficiency when Your Refrigerant Circulates *in a* THERMAL UNIT

The same section is used for cooling as is used for heating. The cooling section is a patented aluminum alloy—light weight—does not corrode—cannot be damaged by freezing in service. Each section is tested to 800 pounds hydrostatic pressure. Aluminum alloy is also ductile; has high thermal conductivity; and may be used with brine, water, ammonia, or most any refrigerant.*

In operation the blast of air which is kept passing over the element keeps frost from accumulating.

Thus when Thermal Units are used your refrigerating sections are always working at top efficiency.

The powerful fan assembly and air-stream controls send the cold air to any and all parts of the room with minimum temperature differences between a ceiling and floor. Our engineering department is at your service on any refrigerating problem. Address Thermal Units Company (a subsidiary of Mechanical Manufacturing Co.) Pershing Road and Loomis Street, Chicago.

*For dairy products and other uses, elements may be furnished of Ferrous Alloy.

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New England Distributors
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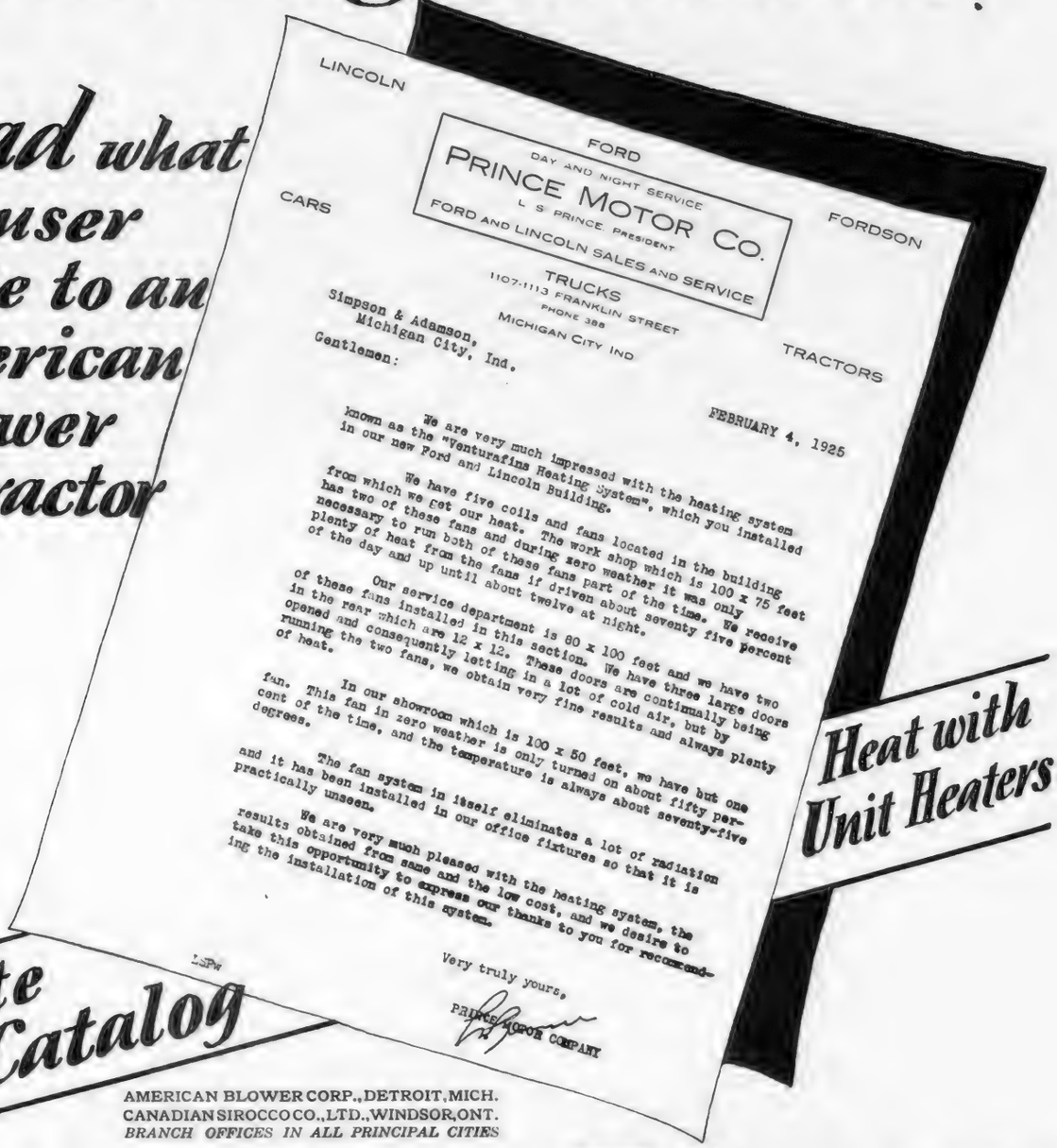
The Venturafin Method of Heating builds good will for Heating and Ventilating Contractors

Read what this user wrote to an American Blower Contractor



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MICHIGAN CITY IND
TRACTORS

Simpson & Adamson,
Michigan City, Ind.

Gentlemen:

FEBRUARY 4, 1925

We are very much impressed with the heating system known as the "Venturafins Heating System", which you installed in our new Ford and Lincoln Building.

We have five coils and fans located in the building from which we get our heat. The work shop which is 100 x 75 feet has two of these fans and during zero weather it was only necessary to run both of these fans part of the time. We receive plenty of heat from the fans if driven about seventy five percent of the day and up until about twelve at night.

Our service department is 80 x 100 feet and we have two of these fans installed in this section. We have three large doors in the rear which are 12 x 12. These doors are continually being opened and consequently letting in a lot of cold air, but by running the two fans, we obtain very fine results and always plenty of heat.

In our showroom which is 100 x 50 feet, we have but one fan. This fan in zero weather is only turned on about fifty per-cent of the time, and the temperature is always about seventy-five degrees.

The fan system in itself eliminates a lot of radiation and it has been installed in our office fixtures so that it is practically unseen.

We are very much pleased with the heating system, the results obtained from same and the low cost, and we desire to take this opportunity to express our thanks to you for recommending the installation of this system.

Very truly yours,

PRINCE MOTOR COMPANY

LSPW

Heat with Unit Heaters

Write for Catalog

AMERICAN BLOWER CORP., DETROIT, MICH.
CANADIAN SIROCCO CO., LTD., WINDSOR, ONT.
BRANCH OFFICES IN ALL PRINCIPAL CITIES

(727)

American Blower

"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

Stand on it!

The fins of the York Super-Fin won't buckle under your weight

Remarkable Strength

is an outstanding characteristic of York Super-Fin extended surface radiation. Sheer rugged strength hitherto unattainable.

The sturdy, helical copper fin is solidly imbedded in the heavy copper tube. It gives the tube the strength of a wire-wound gun barrel.

YORK SUPER-FIN RADIATION

The strain of expansion and contraction between tube and header has been positively eliminated by York U-tube construction. There aren't any joints to leak—all parts are fused solid.

Every York Super-Fin unit is tested at 1000 pounds hydraulic pressure and is guaranteed for 200 pounds operating pressure. It is a high-pressure heating surface at low-pressure prices.

Casings are 12 inches thick, either 23 or 35 inches high, in several lengths, with 1, 2, 3 or 4 nominal depths of pipe in one casing.

Here is the sturdy, dependable copper coil the heating industry has needed. Detailed information will be sent on request and personal service rendered without obligation by the nearest of the many York representatives. Write to York Heating & Ventilating Corporation, 1522 Locust Street, Philadelphia.

YORK SUPER-FIN

Extended Surface Copper Indirect Radiation for Central Blast Systems

YORK HEATING & VENTILATING CORP'N
PHILADELPHIA

Engineered Products

Manufacturers of the Famous York Heat-Diffusing Unit

TURTLEBACK
TRADE MARK

LUCK?

Architects and Engineers do not trust to luck when selecting equipment. It is only after thorough investigation and tests that TURTLEBACKS are standard in most specifications.

"Turtlebacks" are highly advantageous for the fan system used in theatres, schools and auditoriums, where close regulation and free air flow are demanded.

Easily installed, simply adjusted, and rigid when locked in place by center set screw.

Write for illustrated catalog

VENTILATING PRODUCTS CO.
2800 Cottage Grove Ave., Chicago, Ill.

EMERSON EXHAUST FANS

12 inch
16 inch
18 inch
24 inch
30 inch
and 36 inch.

Every refinement that assures sturdy, powerful, quiet service. Well adapted for unit heater use. Powered with fully enclosed Emerson motors, specially designed for exhaust fan service . . . Ventilating fans and accessories, including louvres, wall boxes and mounting panels. Complete cooperation by Emerson Engineering Department in planning installations.

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2018 Washington Ave., St. Louis
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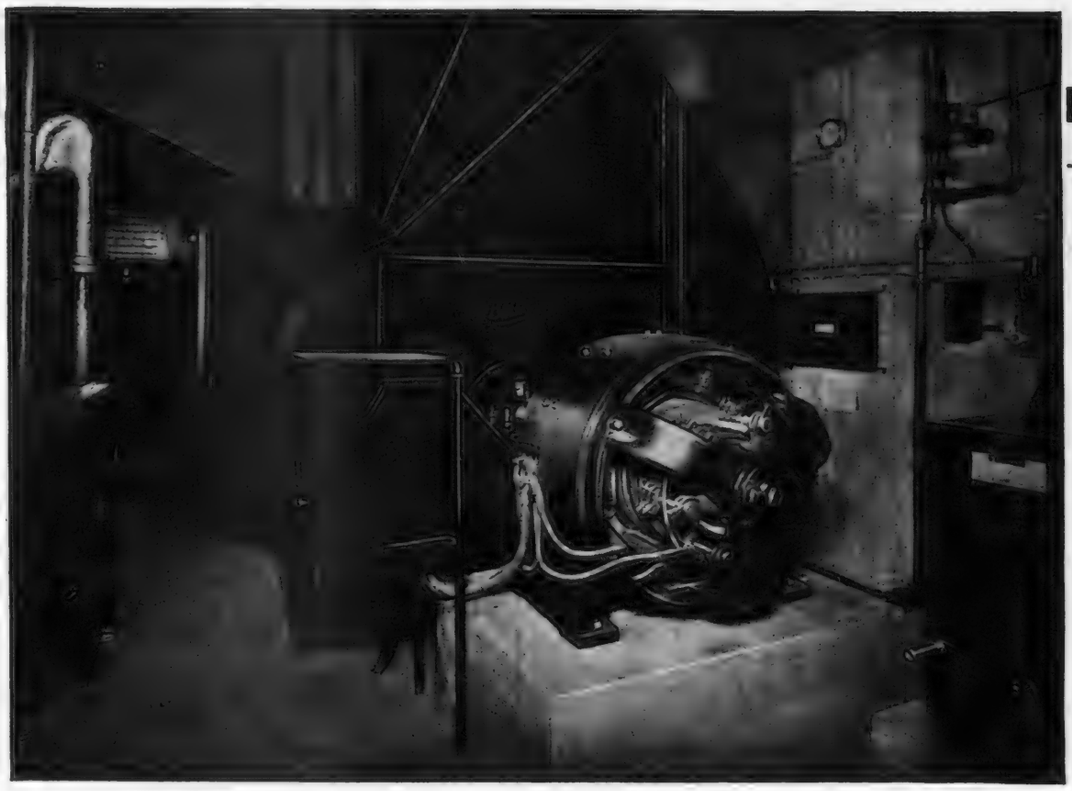
BUILT TO LAST
EMERSON MOTORS *and* **FANS**

The Three Essentials-



Ventilating fans must meet a triple requirement in order to be satisfactory to the user.

They must be efficient in the broadest sense of the word, in horsepower, in cost of maintenance, in space occupied and in air delivered.

They must be as nearly silent as is possible, with no vibration.

And last, they must be durable enough to last for years of steady use.

Ask the man who specifies Buffalo Duplex Conoidal Ventilating Fans what his clients think about them and you'll know why Duplex Ventilating Fans are specified for so many important buildings.

Buffalo Forge Company

480 BROADWAY -:- -:- BUFFALO, N. Y.

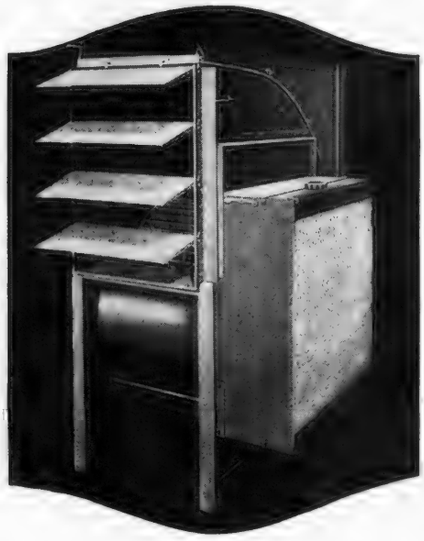
In Canada—Canadian Blower & Forge Co. Ltd., Kitchener, Ont.

"Buffalo" Ventilating Fans

JOHNSON

high velocity

Unit Heaters



Are constructed to meet the rigid heating requirements where ceilings are high and the area large.

A greater range of heating distribution is obtained, thus effecting important economies such as lower installation costs — fewer unit heaters per area required—quicker heating in a given area—a uniform distribution of heat.

In Johnson high velocity unit heaters, the motor, fan and heater are designed to maintain a high standard of efficient performance at all times, which means low power consumption.

Quietness of operation, low maintenance costs, sturdy construction, minimum piping requirements are further economic qualities embodied in Johnson high velocity unit heaters that justify serious consideration.

The Johnson unit heater is a profitable investment—not an expense.

Johnson Fan & Blower Co.

Manufacturers of Fans and Blowers for All Purposes

1323 West Lake Street CHICAGO

TYPHOON

Multiblade Disc Blower

Disc Blowers
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Belt-driven Direct-connected
Unit Drive Fans
Unit Heaters
Ventilating Systems
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Typhoon Products and Typhoon Systems have been installed all over the country and all over the world. Typhoon is an international standard of efficiency for cooling, heating, and ventilating systems.

TYPHOON FAN COMPANY

345 West 39th Street
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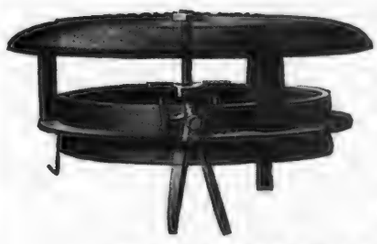
Dealers' and engineers' inquiries invited

The Raymond Weather Compensator used in conjunction with a room thermostat controls the heating system automatically in response to the three variables of room temperature, outdoor temperature, and boiler temperature. Write for details.

F. I. Raymond, River Forest, Illinois.



E-Z DAMPER GRIP-TITE Floor Vents

POSITIVE AIR CONTROL AT FLOOR LEVEL

ÆOLUS DICKINSON

3336-44 So. Artesian Ave. CHICAGO

(Some territory open for agents)

So quiet....

you cannot detect the slightest operating sound!

EXCEPT for an abundance of invigorating air, you would not know that the "Silent" Sturtevant Unit Ventilator was in operation.

Smoothly, silently the fan and motor within the attractive metal cabinet draw pure air into a room.

Silent unit ventilation is a notable Sturtevant attainment. Because of the special design of the fan wheels used in the "Silent" Sturtevant Unit Ventilator, the air is moved noiselessly, and in addition, a saving in electric power is effected.

Now you can have the high efficiency of unit ventilation without any disturbing operating noise. Write to the nearest Sturtevant office for Bulletin No. 344-A which gives complete information about this latest achievement in unit ventilation.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Charlotte	Dallas	Indianapolis	New York	St. Louis
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Sturtevant REG. U.S. PAT. OFF. *the Silent Unit Ventilator*

TENTACULAR

"for Higher Efficiency in Power Transmission"

Another successful "Tentacular" added to the many thousands now in use

Fan Pulley Diameter 21 Inches; Motor Pulley Diameter 3½ Inches; Motor 3 H. P.; 1710 R. P. M.; Centers 31 Inches; Tentacular Single Belt 2½"

In spite of the ratio one to six, there is no slippage. Why?

Because "Tentacular" clings to the pulley surfaces. Its under surface is soft green leather strips, secured by noiseless hollow rivets to the sturdy backing—the reason for this powerful adhesion and efficient transmission of "Tentacular."

Absolutely Noiseless

Does Not Require Any Special Faced or Grooved Pulleys

No Slippage—Increases Speed and Machine Production.

Tentacular Belting Transmits Twice as Much Power as Ordinary Flat Belting

Makers of a Complete Line of Leather Belting.

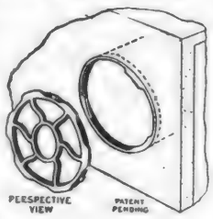
Alexander Brothers, Inc.

19 South Street, Philadelphia, Pa.

Branches and Distributors in All Principal Cities.

HOW TO SAVE MONEY ON INSTALLATION COSTS!

The next time you have a theatre or school auditorium ventilation job, save money by using DISC-LOC *round shaped* vents. They are easier and cheaper to install than oblong step grills. Made with or without dampers. Full particulars and list of installations supplied on request.



Knowles Mushroom Ventilator Co.
202 Franklin St., NEW YORK

for gallery risers USE Round shaped Vents

—a line of controls you'll be proud to represent

Teeple Controls meet every problem of heat control for gas furnaces and boilers; unit heaters; refrigerating plants; ovens; furnaces; and automatic coal and oil burners. Accuracy and reliability are built into every instrument manufactured. You can recommend Teeple Controls to your customers.

CLOCK THERMOSTAT

Write for this new Catalog....

Our latest catalog fully illustrates and describes the full line of Teeple Controls. Gladly sent.

RELAY TYPE G

L. R. TEEPLE CO.
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TEEPLE TEMPERATURE Controls

for GAS — STEAM — WATER — AIR

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BOSS BOLT AND NUT COMPANY

MANUFACTURERS OF
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AND BOSS LOCK NUTS

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CHICAGO, ILLINOIS

TELEPHONE
LAFAYETTE 6920

January 18, 1928

The New York BlowerCompany,
2248 S. Halsted St.,
Chicago, Ill.

Attention Mr. J.W.Mathis.

Dear Sir:-

We have installed in our plant here six of your large size "Comet" Unit Heaters and find through three heating seasons that all that you have said concerning these heaters have been fullfilled.

We enjoy uniform temperature during the coldest winter and reiterate that we are perfectly satisfied with the installation.

Very truly yours,

BOSS BOLT AND NUT COMPANY

Harley E. Burns

General Manager

EB:AS

Comet Unit Heater
Overhead Mounted Type

No. 60 Comet
6000 CFM
equal to 2000 sq. ft.
Direct
Radiation at
1/3 of the cost

WHEN you specify or install New York Blower heating and ventilating equipment you may be sure of accurate ratings, responsible guarantees . . . . and real cooperation.

The above letter, selected at random, is a typical expression of the heating comfort and satisfaction enjoyed by many owners of Comet Unit Heaters. *Write for Bulletin 85.*

Fans—Blowers
Unit Heaters
Air Washers
Furnaces

NEW YORK BLOWER COMPANY

General Offices
2242 So. Halsted St.
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EXHAUST ~~ACID FUMES~~ Right!

CORROSIVE fumes are destructive to ordinary materials.

Painting, coatings and linings on the exposed surfaces of exhaust fans handling such fumes give only temporary protection and require eternal vigilance.

Duriron fans, universally acid resistant, provide the permanent solution wherever such fumes must be exhausted.

These fans require a minimum of attention, and may be operated at speeds that make them far more efficient than lead or lead-lined units of like size.

Use Duriron Exhaust Fans for—

Laboratories
Chemical Hoods
Battery Rooms
Pickling and Bright Dip Plants
Chemical Processes

Duriron Bulletin No. 140-A should be in your file. There's a copy waiting for you.

Duriron is produced only by
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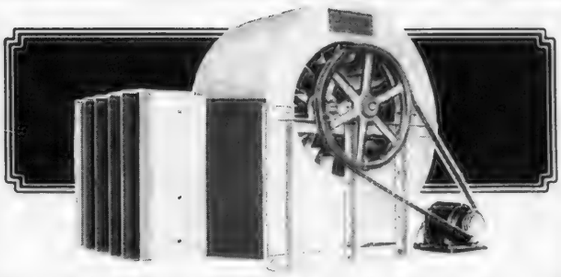


Good Ventilation Makes Business Good

The Lakeside Four-Way Deflector System was designed especially for use in theatres and buildings where quiet operation is absolutely essential. The patented Tex-rope Drive [wedge shaped belting] SKF Bearings throughout, specially designed and perfectly balanced impeller [installed off-center] and specially designed, quiet running low-speed motor insure freedom from noise, friction and vibration.

EASY TO INSTALL

The Lakeside comes ready for installation. It requires no tearing down of walls or ripping up of floors to put in service. It is so compact that it fits into a very small space, and can be dis-assembled easily into three parts of convenient size to move through small door openings. Quickly installed, without great expense or interruption of business.

Write for Catalog which gives specifications, dimensions and capacity ratings of Lakeside Ventilators, which are made in sizes to meet practically every requirement.

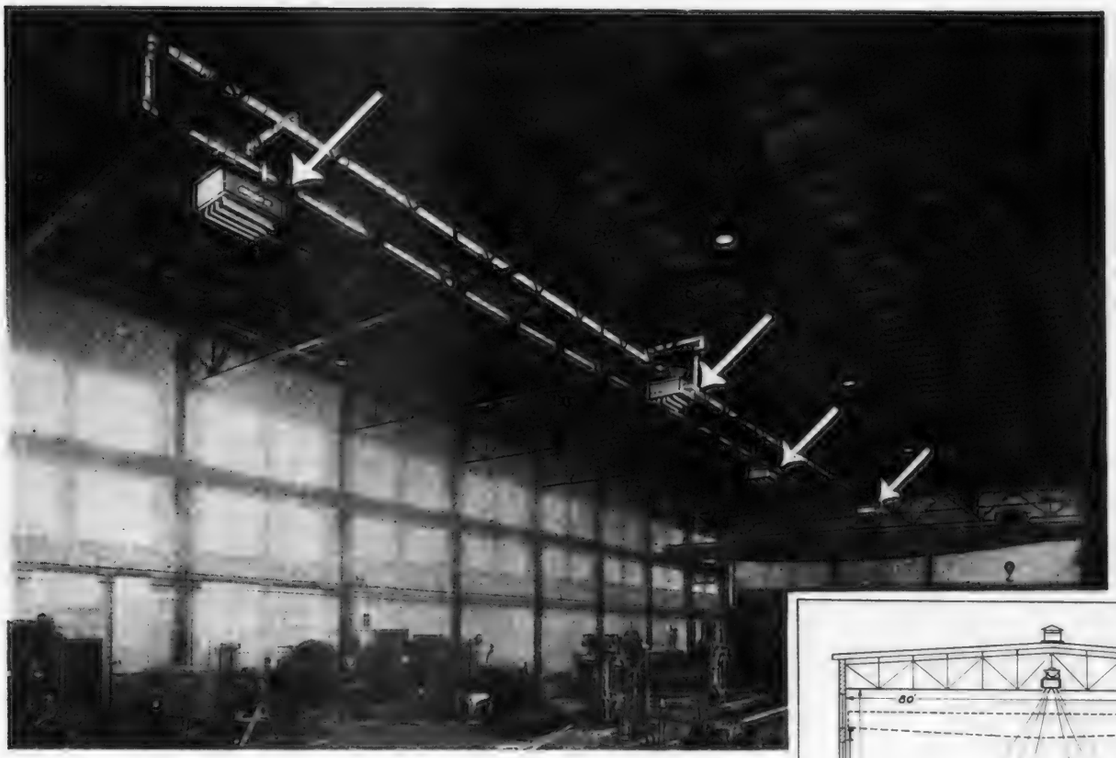
LAKESIDE COMPANY, 104 Main St., Hermansville, Mich.

Lakeside
Quiet *Electric* VENTILATOR

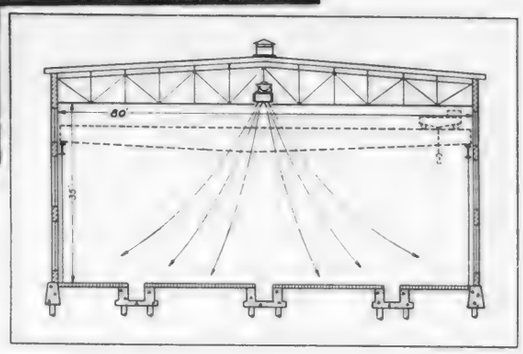
HARTMANN
RADIATOR BRACKETS

THREE STYLES
AR NR NV

Write for Descriptive Circular and Price List
CHARLES HARTMANN CO.
975-993 Dean Street . BROOKLYN, N. Y.



HEAT
with
Unit
Heaters



Four Wing Featherweight Unit Heaters, installed above the traveling crane, 35 feet from the floor. At the right is a cross-section of the building.

Above the Crane Out of the Way!

Wing Featherweight Unit Heaters are located far above the floor, above traveling cranes or any other equipment —therefore well out of the way of workmen and all machinery. *Location at such height is an individual advantage of Wing Featherweight Unit Heaters.*

Floor space is saved—no interference with production. No vitality-sapping hot spots, as with heating equipment placed on the floor or on the walls under the windows.

All steam and return lines are overhead — no pipe trenches or sub-grade boiler rooms.

And in addition, greater heater efficiency—a vertical circulation of air is maintained in the room; the air which rises to the higher levels (which is always the warmer) is gathered in by the Wing Featherweight Unit Heaters, re-heated, and returned to the working level; pocketing of high temperature air under the roof is thereby prevented.

Write for Wing Heater Bulletin.

L. J. Wing Mfg. Co.

Hudson and 13th Streets
New York City

Wing Featherweight Unit Heaters

There's a size and type of Wing Featherweight Unit Heater for every building and for every heating problem.

CYCLOIDAL MULTIVANE FANS

Year After Year of Dependable Service Since 1879

It's a long time to be building fans and blowers—but it certainly proves the high quality and successful performance of Garden City products. Constant operation without servicing is a distinguishing feature.

Architects and engineers who become familiar with the construction and all other outstanding features of Garden City Multivane Fans, know that they can safely specify them in their quality specifications.

A particularly prominent feature is the Fan Bearings. All bearings are dust-proof, oil-tight, automatic chain-oiling, with large oil reservoirs with plugged openings for drains. Length of each bearing is at least four times the diameter of shaft.

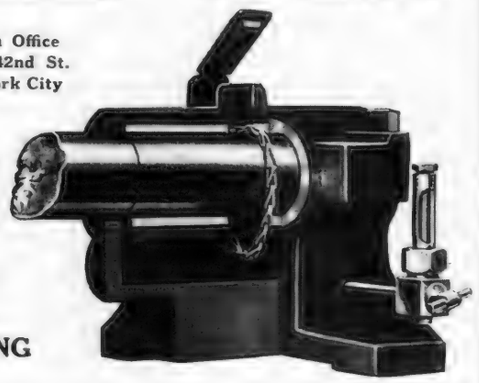
Also manufacturers of Cyclo-Fin Unit Heaters and all types of fans and blowers.

(Complete literature on request)

Garden City Fan Company

McCormick Bldg., :: Chicago, Ill.

Eastern Office
58 W. 42nd St.
New York City



RIGID TYPE BEARING

GORTON SYSTEM

Vapor Heating for Apartments

GIVES PERFECT SERVICE in 3-year tryout at Hazleton, Pa.

John J. Cuyle, owner of three story Apartment, writes:

"The Gorton Vapor System installed in my three story Apartment by Norbert Corrigan of Hazleton, Pa. (Heating Contractor) has been in operation for three seasons and all the rooms are perfectly and evenly heated.

I am an engineer myself and *do not know of anything more that could be asked of a heating system.*"

A satisfied customer is the best investment.

Our Engineering Department will furnish layout for prospective installations.

GORTON HEATING CORPORATION

Formerly Gorton & Lidgerwood Co.

96 Liberty Street, New York, N. Y.

Established 1887

THE No. 3 THERMOFLEX-HYDRON ANGLE RADIATOR TRAP

The Hydron Bellows is the only **hydraulically formed proof-tested** bellows used in thermostatic radiator traps today. Each and every bellows is subjected to several hundred pounds, internal hydraulic pressure in the making. Weak, uneven, or defective metal **will not** make a Thermoflex-Hydron Bellows.

Our new complete catalog No. 52 is now ready for delivery. Gladly mailed upon request.

W. D. CASHIN COMPANY

35 Hartford Street Boston, Mass.

THE INHERENT ADVANTAGES OF HORIZONTAL PLACEMENT

As Incorporated in the Midwest Self-Cleaning Horizontal Air Filter Model "H"

IN any scientifically constructed filter medium, there must be a relatively large dust storage capacity provided on the dirty air side, diminishing in capacity, but increasing in density toward the clean air side.

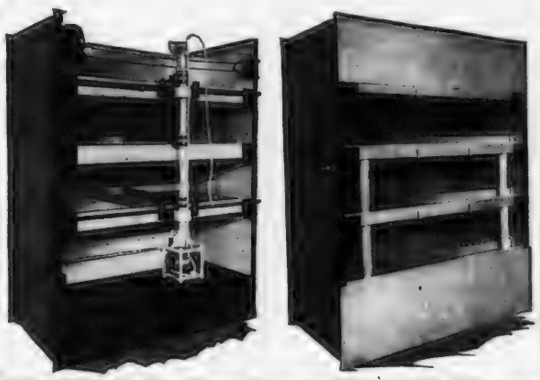
The danger of clogging and inefficient cleaning caused by forcing concentrated mixtures of dust and cleaning fluid through the filter medium is entirely eliminated in the

MIDWEST

Horizontal Model "H"

The accumulated dust is not *washed through* the filter medium, but is *washed off* instead. Viscosine, washing down through the Midwest cell, does not come into contact with that portion of the medium containing heaviest dust concentrations until it has passed through the cleaner portions above.

Cleaning is thus facilitated, and at the end of every operation there is presented to the incoming air a filter medium as perfect and efficient as the day the apparatus left the factory.



MIDWEST AIR FILTERS

INCORPORATED

BRADFORD, PA.

Offices in Principal Cities

SPRACO Filter Cell.

Air Filters

that clean properly because they are built on the right principle

Cleaning the air of dust, dirt and foreign matter is simple enough with the right equipment.

Spraco Air Filters do this most efficiently and economically because of the following reasons: The filter media provides the greatest possible dust collecting surface within a given space, and is arranged so as to change abruptly and continuously the small streams of air passing through it. It consists of a stack of expanded metal sheets arranged from coarse to fine in direction of air flow. It is made adhesive by dipping or charging the cell with a special solution called "Dustix." *Air cannot pass through this media without being effectively cleaned.*

The progressive arrangement of the media from coarse to fine mesh insures high cleaning efficiency with minimum obstruction to air flow.

The use of sectional framework is another important advantage of Spraco Air Filters. It eliminates air leakage, insures perfect alignment and greater strength and rigidity, and low cost of erection. Each section accommodates several cells and can be made to fit the space available. All metal construction.

Consult us about your air filtering, conditioning, washing and cooling problems. Ask for Bulletin F-81.

SPRAY ENGINEERING CO.

60 High Street, Boston, Mass.

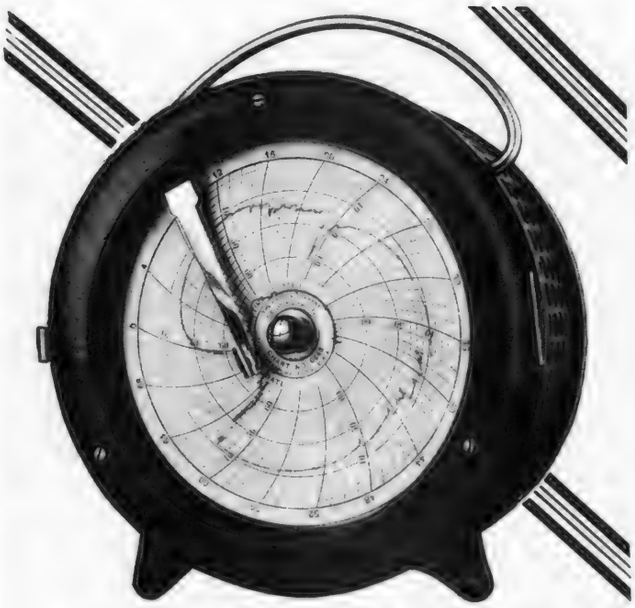
Cooling Ponds
Spray Nozzles
Strainers
Park Sprinklers

Air Filters
Air Washers
Air Coolers
Flow Meters

ENGINEERS *and* TRADE MARK MANUFACTURERS

SPRACO
BOSTON

Cable Address: "SPRACO," Boston; Western Union Code



Something NEW in Thermometers!

A SMALL SIZE

"Handy Bristol's Recorder"

Uses four-inch Charts. Makes continuous 3-day record of atmospheric temperatures. Easily portable; entirely self-contained. Simple, sturdy construction. Very reasonably priced. *Complete Information in Bulletin No. 363*

The Bristol Company

WATERBURY, CONNECTICUT

THERMOSTATIC METAL

The most accurate, constant and durable of expansion units

FOR LOW AND HIGH TEMPERATURES

Our No. 1800 metal for temperatures below 450° F.
Our No. 2600 metal for temperatures below 1500° F.
Other High Heat Metals for special uses.

Positive and Dependable Thermostatic Metals

W. M. CHACE VALVE COMPANY
1600 Beard Avenue
Detroit, Michigan

I am interested in

☐ Reducing Valves
☐ Damper Regulators
☐ Temperature Regulators
☐ Pump Governors
☐ Float Valves
☐ Swing Joint Fittings
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☐ Thermostats
☐ Balanced Valves

Name .....

Firm .....

Address .....

Check off those items in which you are interested, mail to us, and you will receive this catalog, prices, and whatever information you want on Atlas Regulating Devices.

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE

281 South Street, Newark, N. J.

A 300,000-C.F.M. *Streamline* Automatic Filter!

Reed Air

TRADE *filters* ALL METAL MARK

THIS 300,000-C.F.M. Reed Streamline Automatic Air Filter (25 No. 62 sections), photographed during our factory tests, is now cleaning the air for the finishing department of one of the country's leading automobile manufacturers. The Reed Automatic was selected by the purchaser's engineers only after thorough investigation into the exclusive streamline principle and the simplicity, efficiency and reliability of the filter itself.

Entirely automatic. No personal attention required. No mechanical movement. Nothing to wear out—nothing to get out of order. High cleaning efficiency—97% guaranteed. Constant, low air resistance—.25 of water. Easy and economical to install.

These are some of the reasons for the constantly-growing preference for the Reed Streamline —it will pay you to write for all the facts.

REED AIR FILTER CO., Incorporated
218 Central Avenue, LOUISVILLE, KY.
Representatives in Principal Cities

HELICALFIN

Seamless Copper Construction

EXTENDED SURFACE RADIATION

Meets the Demands of Modern Heating and Ventilating Progress

For Permanence and High Efficiency Specify

Rome Helicalfin Tubing

Helicalfin Heater Units and Radiators offer great advantages in high efficiency. The cores consist of tubes and headers made of copper and brass. They are sturdy, compact, light in weight, and last indefinitely with practically no corrosion.

Helicalfin Heater Units and Radiators are the ideal heating equipment for Homes, Schools, Institutions and Industrial Plants.

Rome Helicalfin Radiation has from five to nine times radiating surface of plain tube with proportionate increase in efficiency.

Engineering data covering the performance of Rome HELICALFIN Heaters has been prepared by a nationally known test engineer and is available upon request.

Makers of Good Radiators since 1905

ROME-TURNEY RADIATOR COMPANY

ROME, N. Y.

CAPITOL

HOT WATER

STA-PAK VALVES

Never Need Re-packing

Note the detailed construction of the Capitol STA-PAK Hot Water Valve illustrated above. Here is a real hot water valve of the packless type, extremely pleasing in appearance. For use on pressure or expansion systems. It is a valve that will give permanent satisfaction.

Every STA-PAK valve is made of guaranteed tested materials.

This is STA-PAK No. 24

[Michigan Smelting and Refining Co. now operating Capitol Brass Works]

CAPITOL BRASS WORKS

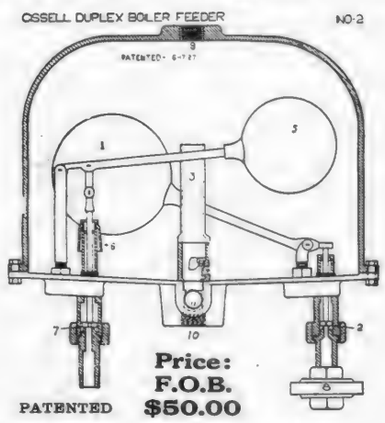
MANUFACTURERS OF BRASS VALVES, BOILER TRIMMINGS AND PLUMBERS' BRASS GOODS

DETROIT, MICH.

Now is the Time

For Real Boiler Protection

While Also Increasing Its Efficiency



Price: F.O.B. $50.00

PATENTED

This Duplex feeder, built especially to meet conditions existing in heating boilers, will make your boiler absolutely automatic, eliminating danger of burning boiler or cracking sections. In selecting a boiler feeder you want the best; thousands of these feeders are in use and never a complaint. So sure are we as to its efficiency, that we sell it with an ABSOLUTE GUARANTEE.

Write for Full Particulars and Discount

Manufactured by

W. M. CISSELL MFG. CO., INC.

111 South Second Street LOUISVILLE, KY.

Filtered air at lower cost!

Above: Single ply of clean AIRMAT magnified 15 diameters. The largest openings (indicated by the black spots) are no larger than pencil points. The overlapping of these openings in adjacent plies precludes the possibility of any direct passageways through the mat for dirt particles.

Below: Outer layer of dirty AIRMAT magnified 15 diameters. The successive plies show considerable but decreasing amounts of entrapped dirt. In this view the openings show white and the dirt particles black.

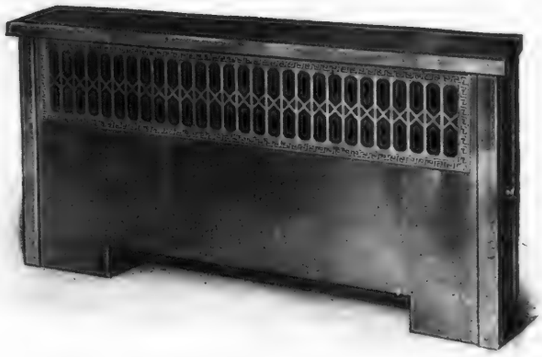
YOU can renew a National AIRMAT Cabinet Filter without soiling your hands. It takes only a minute. Easy as changing a desk blotter. The renewal mat costs only a trifle. The first cost of the filter is low. Space is conserved. No extra space required for accessories.

No wonder the National AIRMAT Cabinet Filter can produce filtered air at a lower cost than the ordinary filters on the market. It's new—but not untried. Let us demonstrate. Ask for the new folder.

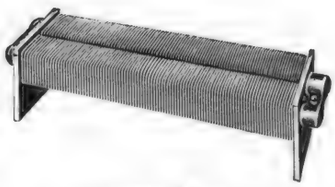
NATIONAL AIR FILTER COMPANY

5130 Ravenswood Avenue
Chicago, Illinois

H & V 4-Gray



Convecto Cabinet



Heat Unit
Light in weight—Compact

Convecto Radiators and Heat Cabinets

For the modern home, apartments, and public buildings, meet the present requirements of the heating engineers and architects with advanced ideas.

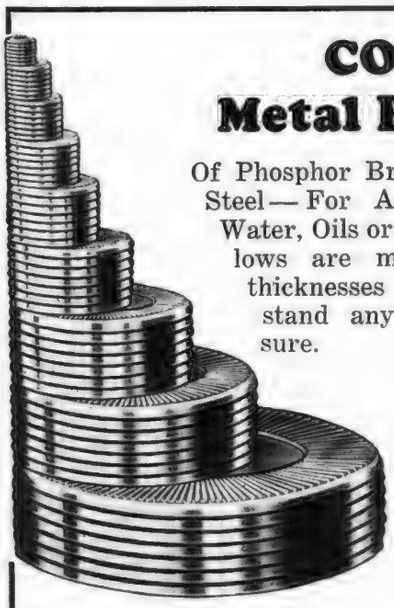
Convecto Radiators are made for all purposes. Heat units are all copper or combinations of copper, brass and steel, and manufactured under a patented expanding process, the only extended surface radiation of its kind made. The heat units are rugged in construction and made for lifetime service.

Convecto Cabinets are capable of finish and artistic appearance to meet the requirements of people of refinement and taste.

Complete Information in our new catalog just issued.

METAL STAMPING CO.

Long Island City New York, N. Y.



COOK Metal Bellows

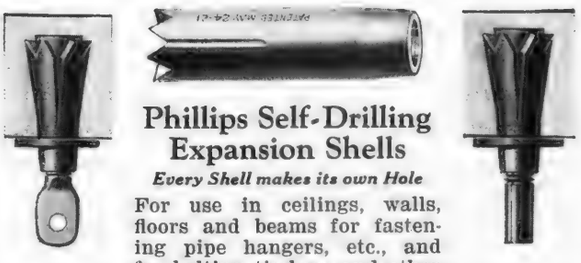
Of Phosphor Bronze, Monel and Steel — For Air, Gas, Steam, Water, Oils or Acids. Cook Bellows are made of various thicknesses of metal to withstand any practical pressure.

Cook Bellows are made with a joint of unique and new design, and are produced by a new process. Made in several sizes and to any length.

A uniformly high grade product at a comparatively low cost.

Our engineers will be glad to discuss the adaptability of the Cook bellows to your particular device.

COOK ELECTRIC COMPANY
2700 Southport Ave., CHICAGO



Phillips Self-Drilling Expansion Shells

Every Shell makes its own Hole

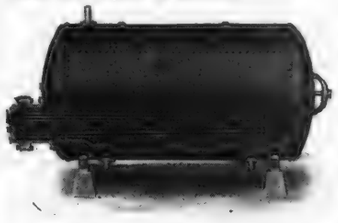
For use in ceilings, walls, floors and beams for fastening pipe hangers, etc., and for bolting timbers and other equipment to concrete and stone. It has internal U. S. Standard Threads for rods, bolts and screws.

Quickly installed with the **PHILLIPS SPRING HAMMER** or by hand. No **DRILLS** are required.

PHILLIPS DRILL CO., 1537 Cortland St., Chicago, Ill.

Alberger Buffalo Heaters

are built for a great variety of standard and special operating conditions for heating water with steam or for the interchange of heat from one liquid to another.



Instantaneous Heaters
Storage Heaters
Swimming Pool Heaters
Economizers
Coolers
Heat Interchangers

ALBERGER HEATER CO. 285 Chicago St.
HOWARD IRON WORKS Buffalo, N. Y.

This is Our Idea of an Efficient Air Washer do you agree with us?

— non clogging. No fine orifice nozzles to become clogged with entrained solids in the water and cause holes in the water screen.

— in place of a bank of fine orifice nozzles; a motor driven centrifugal water sprayer, delivering a water screen the equal of 100 ordinary spraying nozzles.

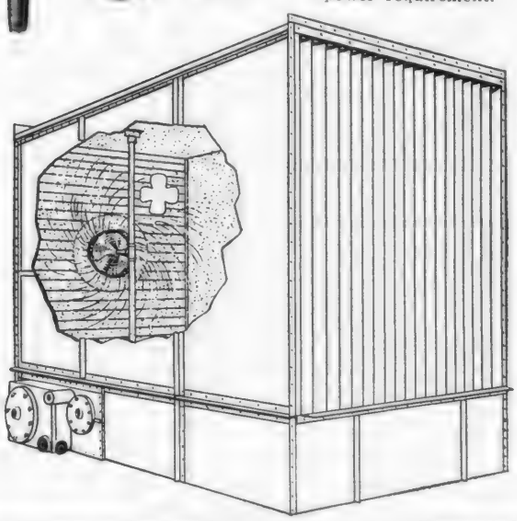
— a single fire type nozzle large enough to permit the passage of entrained solids in the washing water; thus allowing continued use of same water.

— a dense mist screen obtained by directing the water from the single nozzle to a rapidly revolving rotor where it is churned centrifugally into an even, solid spray.

— 40 to 60% power requirement of multiple nozzle system because only 7 lbs. per square inch pressure is needed at the nozzle.

— by replacing multiple nozzle banks with Bayley Turbo-Atomizers present inefficient installations of air washers can be made highly efficient.

The Bayley Turbo-Atomizer and below the complete Bayley Turbo Air Washer. Non clogging and operating with nominal water pressure at low power requirement.



That briefly is the Bayley concept of an efficient air washer and the manner in which the Bayley Turbo-Air-Washer is built and operates. Scores of installations have proven it successful. May we tell you where they are and state the argument more fully by means of Bulletin No. 25.

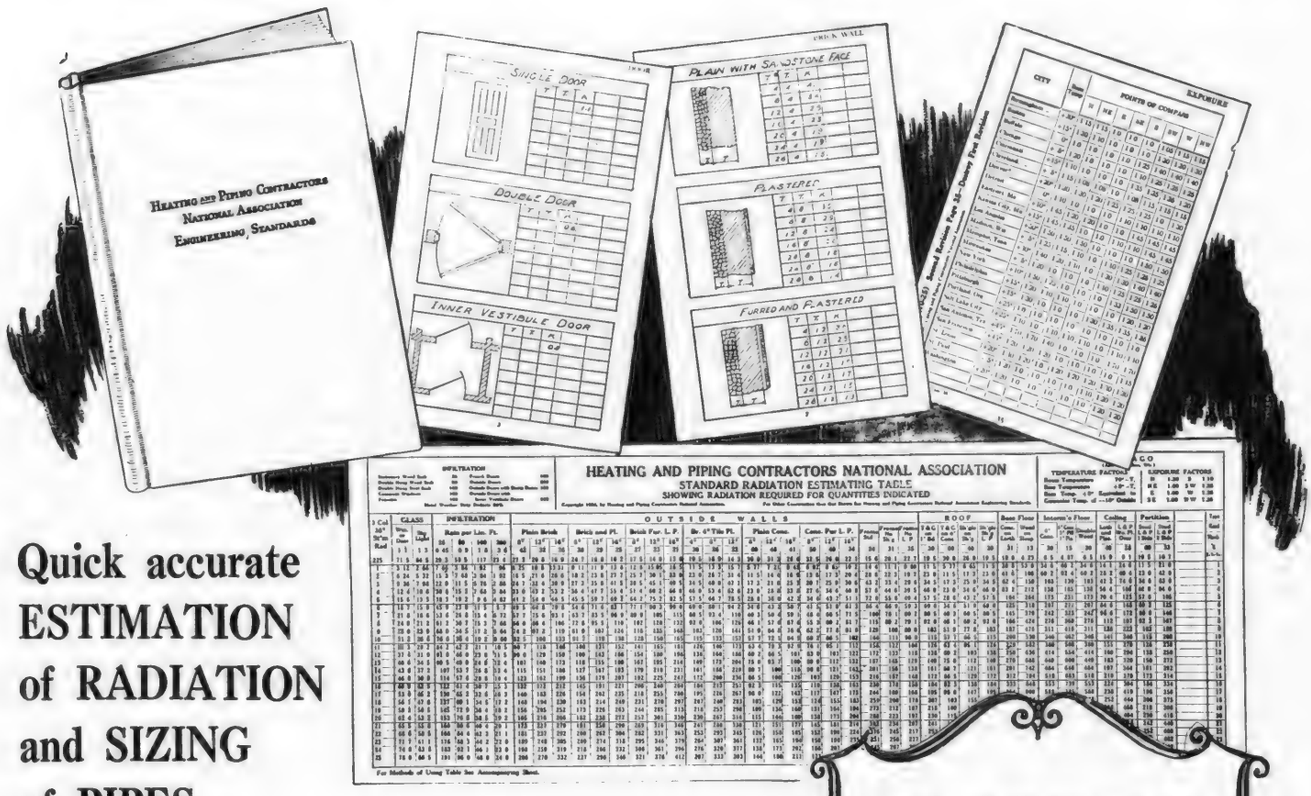
BAYLEY BLOWER COMPANY

742 Greenbush St., Milwaukee, Wis.

Bayley

AIR ENGINEERING & EQUIPMENT

HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS — PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS



Quick accurate ESTIMATION of RADIATION and SIZING of PIPES

A simple fool-proof method is available for every heating contractor.

A wealth of information on radiation has been compiled by a group of America's foremost heating engineers. Over $100,000 has been spent in time and money by the Heating and Piping Contractors National Association so heating contractors may have a reliable guide, so time may be saved, so radiation may be accurately estimated and pipes properly sized. Contractors find this book worth many times its weight in gold. 188 constants are given for various types of construction and thickness of wall, infiltration factors, exposure factors, pipe size tables and other information needed to figure radiation quickly and correctly.

The complete work in a loose leaf binder, entitled "Engineering Standards" may be obtained by readers of this magazine for $5.00. Standard Radiation Estimating Tables for any one of these thirty-one cities, Albany, Baltimore, Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Eastport, Me., Kansas City, Mo., Los Angeles, Madison, Wis., Memphis, Tenn., Milwaukee, Wis., New Orleans, New York, Norfolk, Va., Philadelphia, Pittsburgh, Portland, Ore., Providence, R. I., Richmond, Va., Salt Lake City, San Antonio, San Francisco, St. Louis, St. Paul, Syracuse and Washington, D. C., is given with each book. Please signify the city desired. If your city is not listed, request chart for city nearest your locality.

Fill in the coupon and order today.

HEATING AND VENTILATING MAGAZINE,
386 Fourth Ave., New York, N. Y.

Date .....

Send me copy of "Engineering Standards" complete with all data necessary to correctly estimate radiation in any type of building. Also include Radiation Table for

City of .....

.....

Enclosed find $5.00 to cover cost and postage.

Name .....

Address .....

City and State .....

The Heating and Piping Contractors National Association

—1928 is the 39th year of this nation-wide organization of heating and piping contractors.

America's leaders in heating and piping work are numbered among its members.

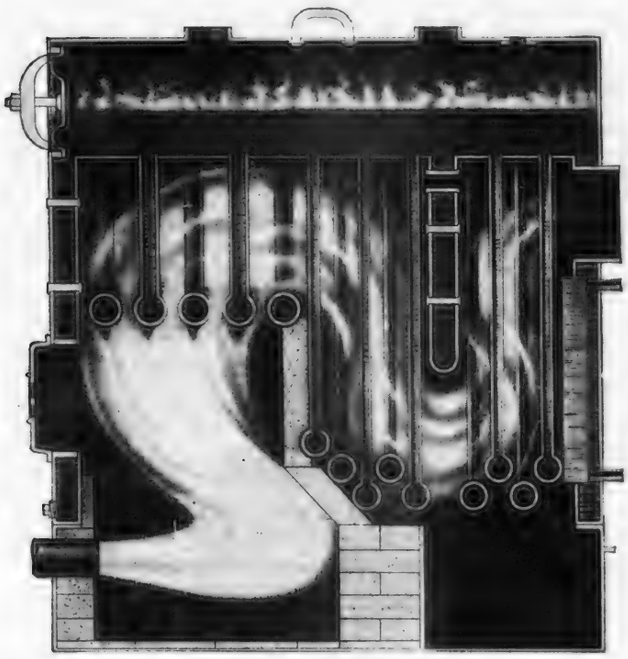
This Certified Heating Insignia of the Heating and Piping Contractors National Association on a heating estimate indicates that the contractor is a member of the National Association and will install the proposed heating plant in accordance with the standards of Certified Heating.

Certified Heating will be fully discussed at the 39th Annual Convention of the Heating and Piping Contractors National Association at Philadelphia, Pa., June 4th to 7th, 1928.

JOHNSTON

Electric Welded

Steel Heating Boiler



OIL BURNER TYPE

ONE PURPOSE. To deliver heat, automatically, dependably, economically; without trouble, almost without conscious thought; year after year.

That is the function of the modern heating plant.

To accomplish that successfully is a big job. You cannot ask the boiler to perform numerous other tasks and still heat the home at maximum efficiency.

The purpose of the heating boiler should be, to heat the home and do that one thing well.

DEPENDABLE. Dealers like to feel that their connection is permanent. Owners want to know that service is dependable. This company, established in 1864, gives to both dealer and owner the backing of sixty-four years of successful boiler building experience.

Johnston Brothers, Inc.

Ferrysburg, Michigan

Clear—and stays clear
Tough—and stays tough

A Moncrieff Gauge Glass is clear and tough—and it stays that way.

Only by insisting on Moncrieff can you be sure of getting genuine Scotch glasses. And from the ample range of the Moncrieff line, you can select a glass in keeping with your special needs.

These glasses include PERTH for steam pressures up to 150 lbs.; UNIFIC for steam pressures up to 500 lbs.; MONAMEL, a glass with red stripe superimposed to emphasize the water line—for 250 lbs. pressure; BEACON RED, an interlayered enamelled glass with red indicator line for steam pressures to 150 lbs.; and PRISMATIC, a flat, clear, specially-toughened glass with prisms; Gauge Glass Strips or Protector Slides.

JENKINS BROS.

80 White Street.....New York, N. Y.
524 Atlantic Ave.....Boston, Mass.
133 No. Seventh St.....Philadelphia, Pa.
646 Washington Blvd.....Chicago, Ill.

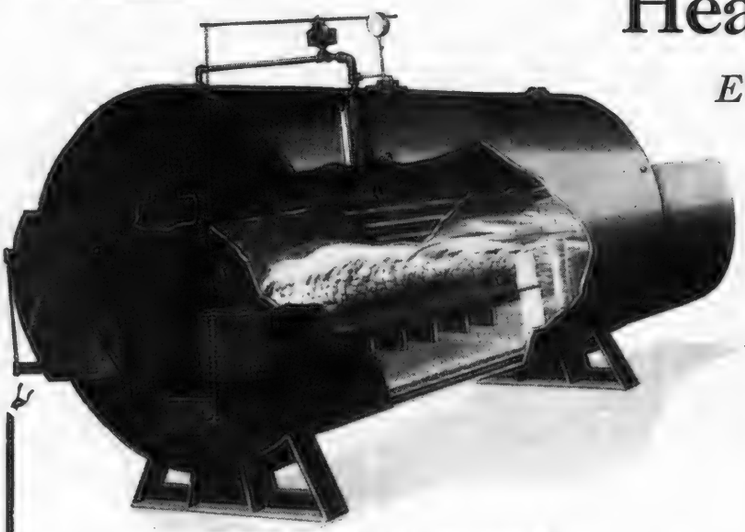
Sole U. S. Agents for MONCRIEFF Genuine Scotch GAUGE GLASSES

MONCRIEFF
Genuine Scotch
GAUGE GLASSES

THE RACINE HEATING BOILER

A Modern Scientific Heating Boiler

Electric Arc Welded



Our fifty years' experience and large facilities have been combined to make this Heating Boiler an outstanding improvement in its line. It combines the finest known types of A.S.M.E. construction and materials. Large combustion space, big water capacity and ample steam space give it the highest degree of efficiency and economy. It is smokeless and the rating is guaranteed. The rapid circulation of the water caused by the circulating tube makes the Racine Heating Boiler ideal for hot water as well as steam. It requires low head room and is the easiest boiler to install and to clean. Boiler is a complete unit when shipped from factory—no brick work to be installed by heating contractor.

AN IDEAL OIL BURNER

The only change necessary to adapt the Racine Heating Boiler to an Oil Burner is to remove grates and bridge wall and build a bridge wall to the specifications of the oil burner manufacturer. We will equip them for any oil burner made.

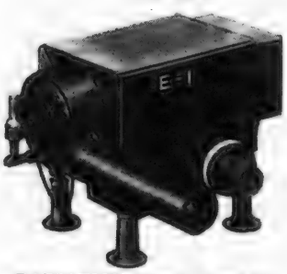
Write for descriptive catalog giving specifications, dimensions and prices of 24 different sizes.

FREEMAN MFG. CO., Dept. H, RACINE, WIS.

IT WILL PAY YOU TO INVESTIGATE THIS BURNER!

Don't let another day by without making yourself acquainted with the Eisler

JUNIOR



RADIATION—250 to 900 Ft.

Made In Three Sizes—Each size has a wide range of adjustments. This insures the proper installation needed.

Each burner is a self-contained unit—controlled by Minneapolis Protectorelay and Protectostat, which are mounted on burner.

Write for Dealer facts at once. A few desirable franchises still open.

DOMESTIC

RADIATION—900 to 3000 Ft.

The Eisler is manufactured by a financially strong corporation, which for many years have been successfully manufacturing precision machinery.

Join our ranks for better and bigger business.

The Eisler is hailed by conservative distributers, dealers and engineering authorities as the final word in oil heating equipment. Quiet, efficient, dependable—one of the most compact, rugged and simplified oil burners being sold today—a real success—requiring negligible servicing.

INDUSTRIAL

RADIATION—3000 to 6500 Ft.

EISLER AUTOMATIC OIL BURNER

Listed as Standard by Underwriters' Laboratories
Approved by The New York Board of Standards and Appeals

EISLER ENGINEERING CO., OIL BURNER DIVISION, Inc.

764 SOUTH THIRTEENTH STREET, NEWARK, N. J.

The Preferred Damper is the Buy-Word for Fuel Economy

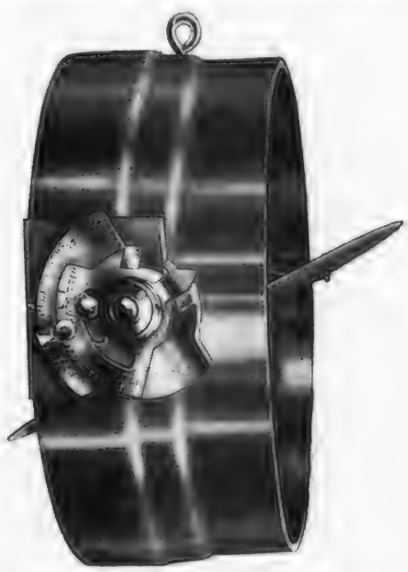
The Preferred 100% Automatic Damper saves from 10% to 25% of the fuel consumption.

Oil heat installations equipped with this Damper, will have a big economical advantage over installations not so equipped.

It is of strong simple construction. Nothing can get out of order. It is guaranteed.

Don't handicap your Oil Burner. Let each installation do full justice to you. Write for literature.

Listed as Standard by Underwriters Laboratories.



Patents Applied For

Preferred Utilities:

PREFERRED 100% AUTOMATIC DAMPER
PREFERRED FOOT VALVES
PREFERRED ANTI-SYPHON VALVES
PREFERRED DOUBLE TAPPED BUSHINGS
PREFERRED FLUSH BOXES
PREFERRED VENT PROTECTORS

Other Preferred Utilities are in our laboratory and on test in the field.

PREFERRED UTILITIES MANUFACTURING CORP.

35 West 60th St., New York, N. Y.

Sure net profits

WITH the ever-growing public acceptance of Nokol has come an enlarged field for Dealer sales. The natural result of dependable heating service and proven products over a period of ten years.

While this acceptance has grown, never have Dealers been urged to buy until they had ready sales. The result has been steady growth for them, sure net profits, and a widening market.

Now, to Nokol, we have added Aetna for commercial installations—forming a complete profit line for your every need.

This will be a most profitable year for Nokol Dealers, and we should like to have you read our new sales plan for 1928. Gladly mailed upon request.

American Nokol Corporation

4211 Schubert Avenue - - Chicago

World's Oldest and Soundest Oil Burner Maker

NEW Noiseless NO COAL Nokol
REG. U.S. PAT. OFF.
CLEAN AUTOMATIC OIL HEAT

BREESE DRAFT REGULATOR

Provides an absolutely steady draft, automatically at all times.

THEREFORE:

It saves fuel

Increases efficiency of fire,

Lengthens the firing period,

Reduces the amount of ashes

Makes a coal fire automatic.

Essential where oil burners are used.

Another development of the BREESE ENGINEERING CORP.

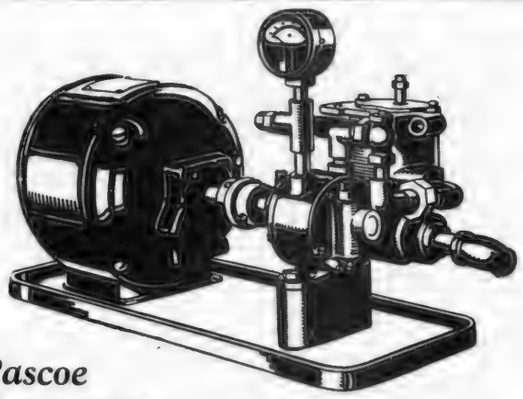
Attractively finished in nickel and two color baked fender enamel.

They sell themselves.

BREESE ENGINEERING CORPORATION

513 W. Jackson Boulevard

CHICAGO ILLINOIS



Pascoe Announces—

a Special Burner for Small Home Heating

There has been an insistent demand for such a burner for years. Attempting to meet this demand, some manufacturers have marketed hurriedly "sized-down" miniatures of their regular burners, which resulted in dissatisfied customers and financial loss to the dealers.

With characteristic thoroughness, Pascoe engineers kept at the small burner problem until it was actually solved. The new Pascoe Burner has ample capacity for heating six and seven room homes in the severest weather, yet is not wastefully large. Moreover, it is priced for families of moderate means—

$275 complete with automatic controls

Tankage and installation costs vary with local conditions.

Exclusive Pascoe Franchise holders will profit richly on this new burner, as well as on the other Pascoe models. They are simple, quiet, and trouble-free, and are nationally advertised. It will pay you to investigate now, so that the Pascoe Merchandising Plan may be working for you when building starts this spring. Write for full details today!

THE WM. H. PASCOE COMPANY

Manufacturers

1314 Belden Avenue, CHICAGO

Pascoe

QUIET OIL BURNER

Pascoe Burners are listed as standard by the Underwriters' Laboratories and approved by the New York Board of Standards and Appeals.

KELLY
No. 2 Vacuum Valve

That "KELLY AIR VALVES ALWAYS MAKE WARM FRIENDS" is a well known fact. Why? For the reason, that they are the most effective valves ever designed and manufactured by us.

Simplicity of parts. Absolutely positive in action.

Compare the design of KELLY VALVES with that of other makes.

Every "KELLY" valve is subjected to a practical Steam and Vacuum test before shipping and all valves are GUARANTEED FOR FIVE YEARS.

Be convinced. Greater value for less money.

Prove what we say to your own satisfaction by comparative tests in actual service.

Manufactured by

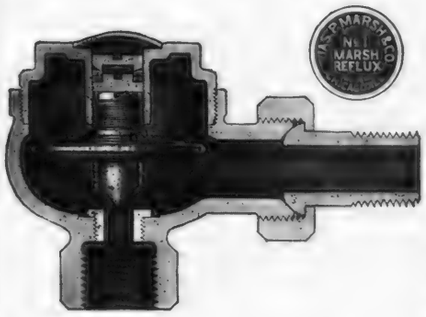
KELLY BRASS WORKS

General Office and Works

226 W. Ontario Street, Chicago

Represented in most leading cities

MARSH REFLUX THERMOSTATIC RADIATOR TRAPS



GUARANTEE ON EVERY TRAP

If any Marsh Reflux Trap might develop a defect in material, workmanship or operation inside of five years after date of installation, such Trap would be replaced free of charge.

The Most Economical, Practical and Efficient Trap for the Average Sized Unit

Marsh Reflux Traps assure full efficiency of Radiator Coil and System.

Automatically discharge air and the water of condensation as fast as it is formed.

The Trap closes the instant steam or vapor strikes the thermostatic diaphragm. Vapor or steam cannot pass through the Trap; therefore every atom of heat is given off in the radiator or coil.

Just one movable part—nothing loose to rattle, chatter or make a noise.

Neat in appearance, handsomely finished and heavily nickel-plated.

The Economical, Practical and Efficient Trap for Both Small and Large Units

Marsh Reflux Traps are all-metal construction including heavy cast brass body, handsomely nickel-plated and with extra heavy special tail piece.

The one movable part—a genuine phosphor bronze non-collapsible Thermostatic Diaphragm—contains the combination of volatile fluids so balanced as to, at all times, distinguish between air and water of condensation and vapor or steam. So corrugated and constructed to eliminate the slightest possibility of rupture from alternate expansion and contraction.

JAS P. MARSH & CO. 114-124 So. Clinton St. **Chicago**

ESTABLISHED 1865

62 YEARS CONTINUOUS EXPERIENCE IN MANUFACTURE OF STEAM SPECIALTIES

Manufacturers of Radiator Traps and Specialties—Automatic Air Valves and Vents—Indicating and Recording Gauges

Agents for Great Britain and Ireland: Chatterton & Co., 30 Fetter Lane, E. C. 4, London
Agents for Dominion of Canada: Taylor-Forbes Co., Ltd., Guelph, Ontario.

"Over the Breakfast Table"

JOHN: It's chilly in here this morning, don't you think?

MARY: Yes, and it's been chilly all winter, too. The bridge club met at Sarah's yesterday and her home was just perfectly warm and cozy.

JOHN: I can't understand that. Yesterday was about the coldest day we've had this year.

MARY: I know, but Sarah has a Bryan Steam Boiler!

In just little intimate conversations like this one begins the movement that eventually lands a Bryan Boiler in the basement of a home. Years of satisfaction follow because Bryan Boilers have proven themselves outstandingly successful oil or gas burning boilers.

Because Bryan Boilers are *designed especially for oil or gas,* they differ from the usual coal burning boiler. Small copper tubes—a nest of them—carry the water right through the hottest point of combustion and turns it ALMOST INSTANTLY into live steam.

Rapid circulation is another Bryan feature. This means QUICK HEAT throughout the house.

Bryan economy of fuel oil or gas is the result of careful, scientific design. Fuel bills will show a decrease ranging from 30 to 50 per cent with a Bryan. This is no idle boast—it's a proven fact!

If you investigate a Bryan you will be convinced. They are reliable, healthful, safe, and perfectly controlled. Even temperature in every room.

Exclusive sales franchises are granted to the heating trade in open territory

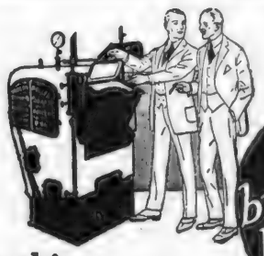
BRYAN STEAM CORP.

PERU (*Boiler Division*) IND.

402 Bryan Building

BRYAN

MEMBER OIL HEATING INSTITUTE OIL HEAT



NO FORCED DRAFT

burns No. 1 Buckwheat

Breaking the Record for Low Coal Bills and Efficiency!

Low pressure steam and hot water heating boilers and tank heaters that burn No. 1 Buckwheat . . . . . No mixing with expensive coal . . . . . Magazine needs filling only once in 12 to 24 hours . . . . . No blower. No motor. No electric current. No machinery to get out of order . . . . . Twenty-one sizes . . . . . *Coal bills cut one half!*

Have you our Catalog and Price Sheets?

The **MOLBY HEATING BOILER** *and* **Heavy Duty Tank Heater**

MOLBY BOILER COMPANY

(Subsidiary of The Universal Pipe and Radiator Company)

New York: Graybar Building, 420 Lexington Ave.

Landsdale, Pa.: 41 Central Ave.

Do You Still Use Large Domestic Coal?

Why not economize by using Buckwheat Coal—at about half the price of domestic coal?

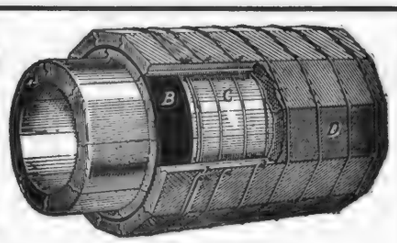
You can burn Buckwheat with PYRAMID GRATES

Let Us Send Full Details

PYRAMID IRON PRODUCTS CO.

230 East 41st Street New York City

Wyckoff's Improved Cypress Covering



Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.

Powerful but Sensitive!

The Ideal Damper Regulator for Closed Hot Water Systems

TYPE F

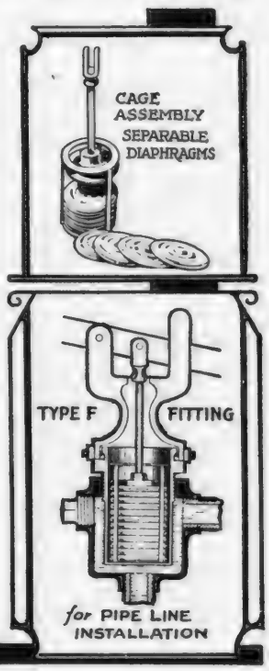
Each Metaphram is a hermetically sealed "wafer" which expands with increase of temperature. Twelve Metaphrams are used in Type F.

Standard equipment on the better boilers.

2″

The volatile liquid in the twelve Metaphram expansion units of the Type F makes it a most powerful and most sensitive regulator. Operates on a slight change of temperature—gradually—surely—and with abundant power.

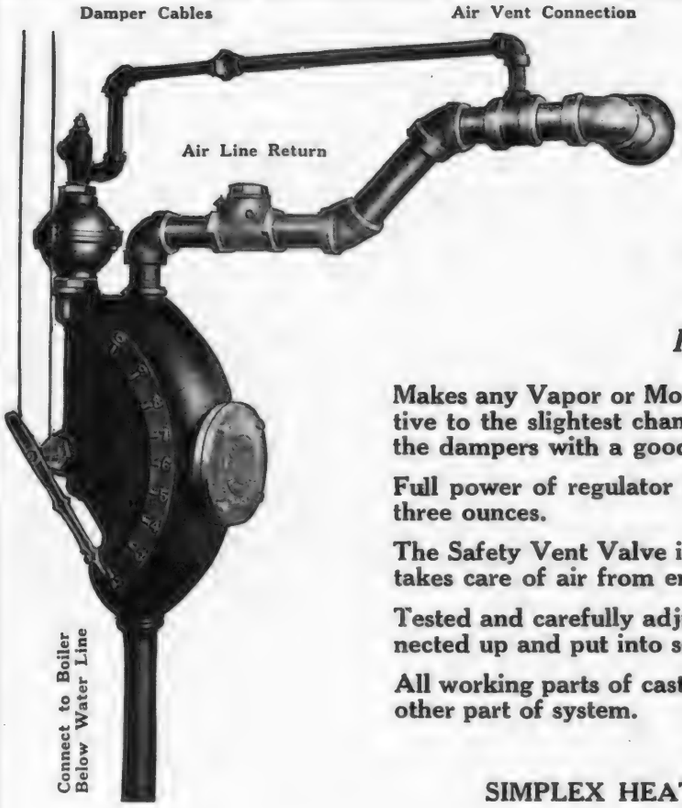
METAPHRAM DAMPER REGULATOR



Saves fuel by maintaining uniform heat by perfect draft regulation. Type F operates in a 2″ dry well in boiler or in special fitting in pipe line. Y fitting may be used. Type F is removable for inspection or replacement ***without draining boiler.***

Make installations more satisfactory to owner and more profitable to you by adding a Type F.

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO
Manufacturers of the National System of Automatic Temperature Control



Wiley

Safety-Vent Vapor Regulator

POWER IS ITS MIDDLE NAME

Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.

Full power of regulator is exerted within a pressure range of two or three ounces.

The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.

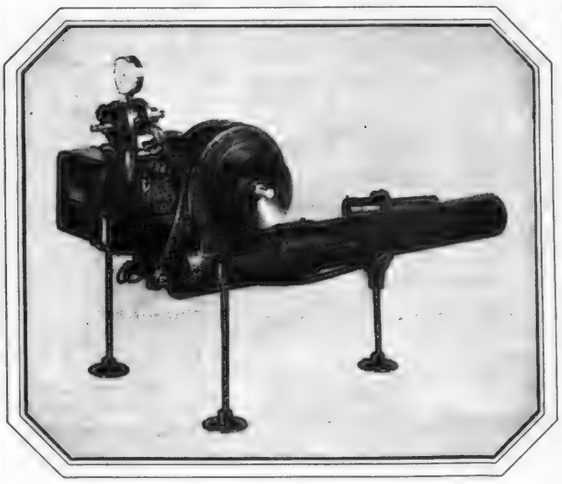
Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.

All working parts of cast bronze. Will last as long as the boiler, or any other part of system.

Write for details

SIMPLEX HEATING SPECIALTY COMPANY, Inc.
LYNCHBURG, VA.

The NEW KLEEN-HEET TYPE 800



STAYS SOLD
NOISELESS, EFFICIENT, SIMPLE

YIELDS PROFITS that *remain* profits. Service possibilities reduced to minimum; every part immediately accessible. Only *one burner size*—reducing burner inventory—covers entire capacity range of from 600 to 6800 square feet steam load.

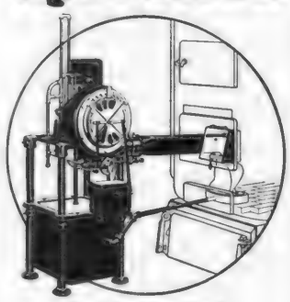
TERRITORY OPEN

Write for details

WINSLOW BOILER & ENGINEERING CO.
844 Rush St., Chicago, Ill.

7 Reasons for Dependable Operation

- **Continuous Flame**
- **Mechanical Draft**
- **Graduated Control**
- **Fully Automatic**
- **No Gas Pilot**
- **No Electric Ignition**
- **Continuous Even Heat**



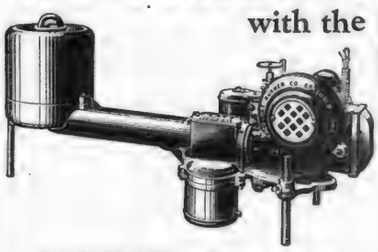
Listed as standard by Underwriters

Complete Display at Booth 75
American Oil Burner Association Convention
April 3, 4 and 5 Stevens Hotel, Chicago

McILVAINE BURNER CORPORATION
Dept. H 749 Custer Ave., Evanston, Illinois

McILVAINE OIL BURNER

It's Time to Line Up with the LACO

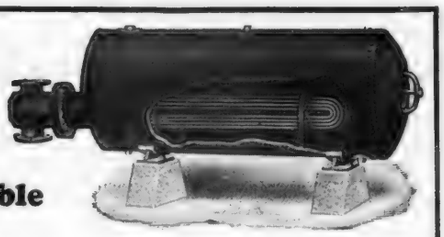


If you're planning a real oil burner business for 1928 you'll want to line up *now* with the LACO. Made in five sizes—meets all price competition and is second to none in economy of operation and freedom from bothersome service calls.

GUARANTEED. Write for dealer terms and full particulars.

LACO GAS BURNER CO., Griswold, Iowa.

O. E. F. Storage Heaters Give Dependable Service



These heaters are made in the U-tube and straight tube types; steel of flange quality used throughout. The heavy gauge seamless drawn copper tubes are expanded into rolled steel tube sheets.

O. E. Frank Heater & Engineering Co., Inc.
Factory and Offices at Buffalo, N. Y.

SWARTWOUT
Steam Products

Swartwout Air Separator
Either cast iron or cast steel.
99% Dry Steam Guaranteed

Swartwout Cast Iron Exhaust Head
Built to last a lifetime

Swartwout Low Pressure Float Trap
Large Capacity—Self-Cleaning Valve

Swartwout Steam Separator
Separation by the centrifugal principle

Swartwout Bucket Type Steam Trap
Intermittent action—pressures to 250 lbs. Trouble-Free.

The products illustrated are only a part of the Swartwout line. We would like to give you full information on Swartwout Traps, Separators, Exhaust Heads and Strainers.

THE SWARTWOUT CO.
General Offices: **18525 Euclid Ave., Cleveland, Ohio**
Factories: **Cleveland and Orrville, Ohio**

Steam
in 4 Minutes after Lighting

2-H.P. Style "A" Ofeldt Gas Boiler. Supplies steam for bottle washing and sterilizing in a dairy.

—with an Steam in 4 minutes Ofeldt WATER TUBE

GAS FIRED BOILER

The Ofeldt is one of the FASTEST STEAMING BOILERS on the market,—it is a dependable source of ever-ready steam for ALL PROCESS PURPOSES.

By using an OFELDT GAS STEAM BOILER you can BETTER AND INCREASE YOUR PRODUCTION.

We have prepared an interesting illustrated Bulletin regarding PROCESS STEAM GENERATION AND OFELDT BOILERS. Use coupon.

MEARS-KANE-OFELDT INCORPORATED

Manufacturers of
GAS BOILERS AND WATER HEATERS
1903-1915 EAST HAGERT ST. PHILADELPHIA

New York City—9 Park Place
Boston, Mass.—100 Arlington St.
Buffalo, N. Y.—Walbridge Bldg.
Chicago, Ill.—363 W. Erie St.
St. Louis, Mo.—2010 Locust Blvd.
Los Angeles, Cal.—940 S. Maple Ave.
Birmingham, Ala.—American Trust Bldg.

Please send me the Ofeldt Bulletin.

Mr..... Title .....

Firm .....

Street .....

City..... State .....

HV-4-28

When such modern buildings install Athey CLOTH-LINED weatherstrips that last the life of the building

There is only one answer. No matter how thoroughly a building may be constructed, Athey Weatherstrips will pay for themselves in less than three years with just the saving in fuel, without accounting for the enormous saving in the handling of ashes, fuel or the reduction in cleaning.

ATHEY Cloth-to-Metal contact weatherstrips change any wood or steel window from a rattling, loose, drafty sash to one that works smoothly and quietly and is absolutely draft-proof when closed.

Why force the Heating Plant by trying to heat all outdoors when a simple ATHEY installation quickly pays for itself with the saving in fuel? (*Another Chicago office building saved 572 tons of coal in 5 months.*)

London Guarantee & Accident Bldg., Chicago, Ill.

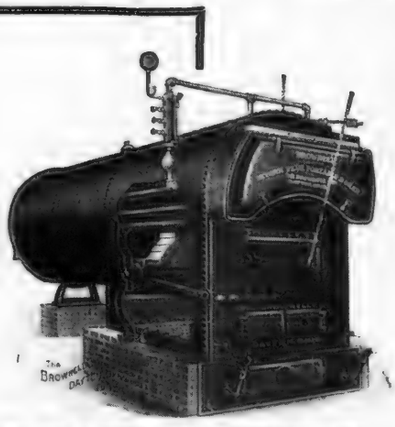
ATHEY COMPANY
6047 W. 65th St. Chicago, Ill.

DETROIT
W. O. LeSage & Co.
410 Donovan Bldg.

MONTREAL, QUE.
Cresswell-McIntosh
Reg'd—420 Seigneurs St.

A few Athey Weatherstripped Buildings that enjoy comfortable tenants and low coal bills

WHY a Boiler by BROWNELL ?



Because in a Brownell you will get a Heating boiler with 73 years of specialized boiler building experience back of it.

Riveted steel construction of accurately known strength with nothing left to guesswork. Most advanced designs. In fact, everything that it is possible to build into a modern boiler to develop high efficiency with minimum fuel consumption is found in the Brownell.

Brownells comply with ASME and all state codes. Consult nearest Brownell representative. Also GET BULLETIN B6-a.

BROWNELL HEATING BOILERS

The Brownell Co.
Dayton, Ohio
Established 1855

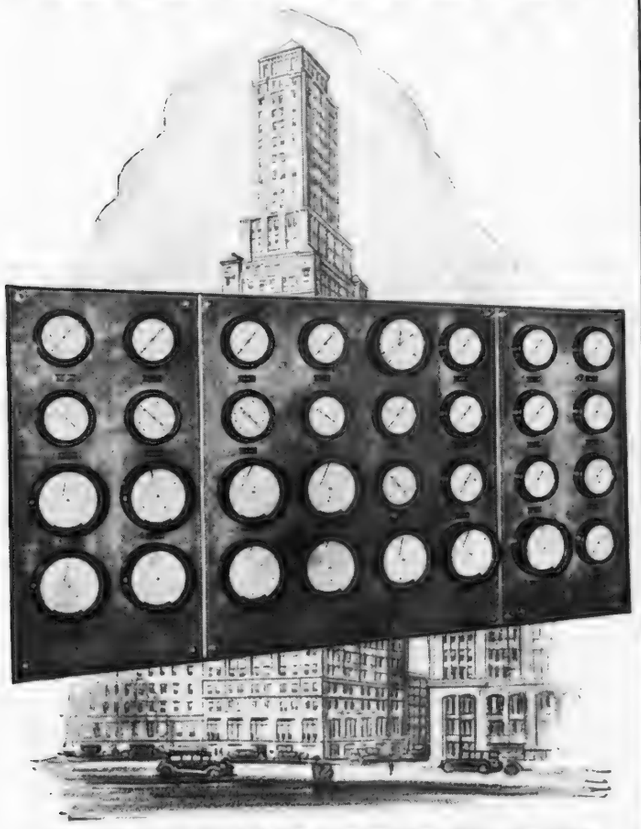
This Float Valve won't leak

Only in the Davis Float Valve do you find this perfected, tight-closing disc—the distinctive feature that absolutely prevents leaking. Positive action is absolutely necessary in this valve's service, maintaining a constant water level in tank or reservoir. Its frictionless operation is another important feature. There is no packing. The inner valve and piston are loosely fitted —action is free—it cannot stick.

Accurate regulation and certain protection are assured with Davis construction and design. The catalog gives the detailed description. Send for your copy.

G. M. DAVIS REGULATOR CO.
436 Milwaukee Avenue
Chicago, Ill.

GAUGE BOARDS



American Gauge Board in new Transportation Bldg., New York.
Frank Sutton, New York, Consulting Engineer, Jarcho Bros., Inc., New York, Heating Contractors.

American Gauges, Recording Gauges, Dial Thermometers, Recording Thermometers and Clocks are furnished in the same case for uniformity of appearance, either for wall or flush mounting. They make ideal gauge board installations.

Write for the following Catalogs:

Gauge Catalog A-14,
Recording Gauge Catalog E-14,
Gauge Tester Catalog D-14,
Relief and Pop Valve Catalog V-14,
Thermometer Catalog F-14,
DialThermometer Catalog G-14,
Recording Thermometer Catalog H-14,
Temperature Controller Catalog R-14.

AMERICAN INSTRUMENTS

American Schaeffer & Budenberg Corporation

338 Berry St., Brooklyn, N. Y.
Branches in Principal Cities
Makers of American Industrial Instruments since 1851.

Heating & Ventilating Magazine's New Home has

Patterson PREHEATERS

Instead of permitting the heat in the discharge of the condensation from the heating system to go into the sewer and be wasted, the returns pass through a Patterson Preheater in this modern building.

Thus, the domestic water supply is preheated before it enters the storage heaters, effecting a material saving in the quantity of steam purchased from the central station.

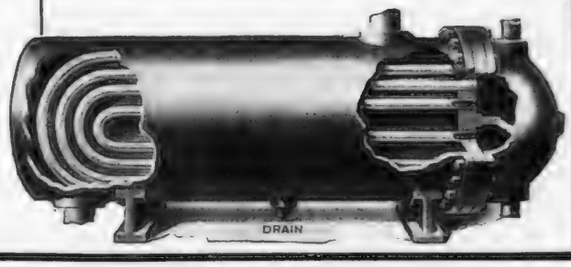
Moreover, the condensed returns are thereby cooled, eliminating possible trouble through discharging hot condensation into the sewer.

Our experience of more than 47 years in the manufacture of Preheaters and Hot Water Heaters assures you of absolute satisfaction when you specify the "Patterson."

Our Catalog sent on request

The Patterson-Kelley Co.

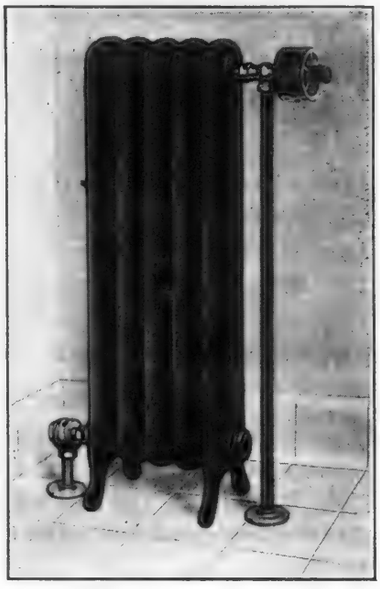
107 East 40th St., New York City



Sterlco
TRADE MARK

ROYS THERMOTROL

FOR INDIVIDUAL RADIATOR INSTALLATION



Installed as Easily as an Ordinary Radiator Valve

Connected directly to the radiator, requiring no system of compressed air tubing or electrical connections to operate it.

PUT AN END TO HEAT COMPLAINTS
Let the room occupants regulate the temperature to suit their individual requirements by turning the knob marked HOT, NORMAL, and COLD. The THERMOTROL keeps up the desired temperature. It keeps down fuel costs by reducing the amount of steam entering the radiator when the desired temperature has been reached.

NO FLUCTUATION. NO WASTE.

Branch offices located in all principal cities.

Write for Bulletin No. 39

Sterling Engineering Company

1630 Holton Street, Milwaukee, Wis.

BOOKS ON HEATING AND VENTILATION

THE DESIGN OF GRAVITY-CIRCULATION WATER HEATING SYSTEMS, by F. E. Giesecke, Ph. D. A book, remarkable for its conciseness and clearness of expression, which contains the essence of the information needed for the proper design of gravity water heating systems, based on the principle that the frictional resistance must equal the force maintaining flow. The importance of the presentation is evidenced by the fact that the entire water heating section of the A. S. H. & V. E. Compendium of Modern Practice has been discarded and replaced with a new section by Doctor Giesecke, embodying the methods here presented in detail. 64 pages of text and 10 pages of tables and charts. Price, $3.00.

PLUMBERS' HANDBOOK, by Samuel E. Dibble. This work contains valuable data for the heating engineer and estimator, architect, building contractor and sheet metal worker, as well as for the plumber. Each subject is treated by a specialist, the section on Pipe Standards and Pipe Dies by F. N. Speller and that on Heating by Alphonse A. Adler. Size 4 x 7 in. 629 pp. 316 ills. Cloth, $4.00.

HOUSE HEATING WITH OIL FUEL, by P. E. Fansler, Associate Editor of The Heating and Ventilating Magazine. Prepared for the use of heating and ventilating engineers, heating contractors and those engaged in the oil-burner industry. One of the outstanding features of the book is the presentation of the subject of oil combustion. Over a dozen beautiful and spectacular flame photographs were made particularly for this book in order that the subject of oil combustion might more thoroughly be presented. Three chapters are devoted entirely to the discussion of salient points of the outstanding oil burners that are on the market to-day. The chapter, "Oil Burners Listed by the Underwriters," is the only authentic, chronological list of oil burners that has been listed by the Underwriters in the past. 32 chapters totaling 362 pages and more than 150 illustrations. Size 7 x 10. Price, $4.00 postpaid.

HEATING AND VENTILATION, by the late John R. Allen and J. H. Walker. This is the second edition of this work and has been brought up to date in every particular, including the latest radiator transmission factors put out by the Research Laboratory of the A. S. H. & V. E. and the Hill synthetic air chart testing method. Especially adapted for use as a text book. Size 6 x 9 in. 322 pages Cloth, $3.50.

A. S. H. & V. E. GUIDE, 1928, sixth edition, with previous sections revised and brought up to date. Includes new tables covering heat transmission from building construction, and comprehensive tables for figuring pipe sizes for gravity, vapor, and vacuum steam heating systems, based upon A.S.H. & V.E. Research Laboratory tests on one and two-pipe steam riser capacities. Size 6 x 9 in. 680 pp. and list of A.S.H. & V.E. members. Cloth $4.00.

DESIGNING, HEATING, AND VENTILATING SYSTEM, by Charles A. Fuller. A treatise on the practical application of the engineering rules and formulas in every day use, in laying out steam, hot water, furnace and ventilating equipment for buildings of all kinds, presented in a simple manner. Price $3.00.

HEATING AND VENTILATION, by Charles W. Brabbée. This is the first American edition of the famous Heizungs-und Luftungstechnik, by Dr. H. Rietschel, and C. W. Brabbée, translated from the seventh German edition, edited and revised to make it adaptable to conditions in the United States. Supplemented by 7 charts covering steam and water heating and ventilation. Size 6 x 9 in. 332 pp. cloth $4.50.

PRACTICAL STEAM, HOT WATER HEATING AND VENTILATION, by Alfred G. King. Containing 396 illustrations. The book is a working manual for heating contractors, journeymen, steamfitters, architects and builders. Describes various systems of heating and ventilation and includes useful data and tables for estimating, installing and testing such systems. 8 vo. 367 pages. Price $4.00.

MECHANICS OF HEATING AND VENTILATING, by Konrad Meier. Including a series of ten charts containing data relating to the flow of water, steam and air, collected by Mr. Meier during an experience of 26 years in heating and ventilating work, both in this country and abroad. Each of the charts replaces a series of tables on the subject, giving at a glance the results of a calculation from any combination of factors. 161 pages, illustrated, with ten large charts. Size 6 x 9 in. Price, $5.00. Separate sets of charts printed on cloth, with lines in different colors and mounted on boards. Single charts, $1.50. Sets of ten, $15.00.

HANDBOOK FOR HEATING AND VENTILATING ENGINEERS, by James D. Hoffman. Fourth edition of this important work entirely rewritten and reset. A standard manual covering theory and practice, with special chapters on heat losses, furnace heating, water and steam heating, mechanical vacuum heating, mechanical warm-air heating, temperature control, electrical heating and refrigeration. With appendix of 75 tables. Size 4½ x 6¾ in. Pp. 478. Price $4.50 postpaid.

HANDBOOK OF THE NATIONAL DISTRICT HEATING ASSOCIATION. Devoted to data on all phases of central station heating work, including generation, distribution, utilization, meters and water heating, compiled by the Association's Educational Committee. All new and revised data for this book will be supplied free for five years. Bound in leather, with six-ring binder. Price $5.00, postpaid.

THE HEATING and VENTILATING MAGAZINE
386 FOURTH AVE., NEW YORK

—KIELEY—

Chanin Const. Co., *Engrs. & Bldrs.*
R. S. Curry Co., *Heating Contrs.*
Louis Black Co., *Plumbing Contrs.*

And now The Lincoln Hotel, New York City's latest, is equipped with Kieley Pressure Reducing Valves. The Chanin Construction Co. chose Kieley Valves because they are reliable and dependable. Kieley products are backed by fifty years' experience.

Kieley & Mueller, Inc.

34 West 13th Street New York City

"We keep others in Hot Water"

SIMS

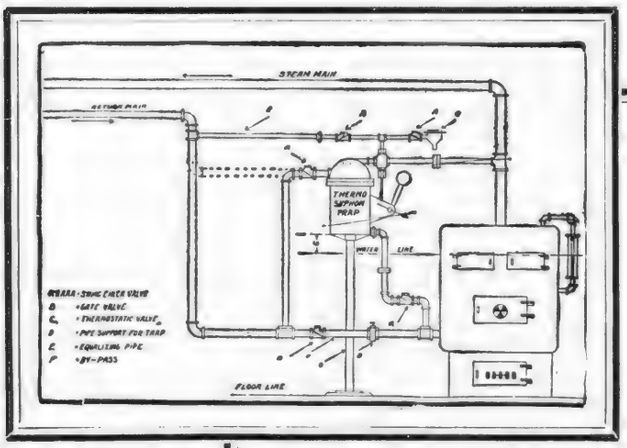
Storage type water heaters are furnished with "U" tubes as illustrated, or with straight tubes and floating head, as may be desired or specified.

SIMS

Water tube heaters and Converters are also constructed with either straight or "U" tubes.

All heaters are produced complete in our plant. They are not an assembly of parts built by others.

THE SIMS COMPANY, P. O. Box 700 Erie, Penna.



Application of Thermo Syphon Trap, showing proper method of piping, for draining any heating system.

For draining vapor, vacuum or any system *without pressure on the returns*, the return line may be run direct to inlet of trap as shown by dotted line.

For All Types of Steam Heating Systems

THERMO SYPHON TRAP

A Boiler Properly Protected Will Last Indefinitely

It is not always the boiler itself that is accountable for a long service record. Its life depends a great deal upon the treatment it gets. A little precaution in the beginning saves costly replacements and inconvenience. The danger of low-water line increases with the use of oil burners. The oil-fired boiler requires little or no attention, and owners fail to maintain the water line, resulting in damage to boiler.

Boilers equipped with Thermo Syphon Traps are safeguarded against burning or cracking. All condensation is returned to the boiler, maintaining the water line, regardless of pressure or vacuum.

As well as a protection to boilers, Thermo Syphon Traps assure proper circulation and noiseless operation. Prevent air-bound or water-logged conditions.

Send for Bulletin No. 16-HV, giving full details.

LYTTON MANUFACTURING CORPORATION

FRANKLIN, VIRGINIA

HIGH GRADE Return, Vacuum, Lifting and Separating Steam Traps, Reducing Valves, Blow-off Valves

Service The *Satisfaction*

VECO SYSTEM of VAPOR HEATING

Write us about the Building you want to heat—any building, regardless of size, character or location. VECO gives the same good service wherever installed.

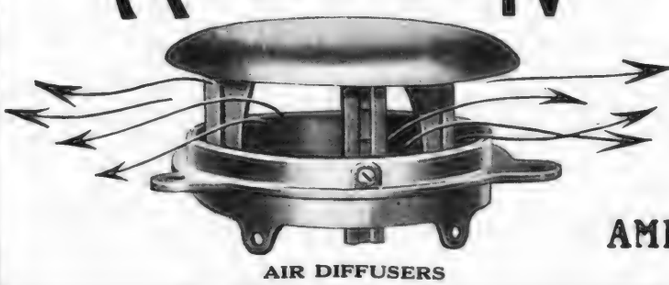
—WE GUARANTEE IT—

VAPOR ENGINEERING COMPANY

PHILADELPHIA—10 So. 18th Street
J. Wilbur Glassey—M. S. Buck

NEW YORK—489 Fifth Avenue
Chas. E. Scott—R. C. Willis

KAUFFMAN



AIR DIFFUSERS

SINCE 1908

Kauffman Air Diffusers

HAVE BEEN IN USE IN

Some of America's Finest Theatres

Simple to Install—Low in Price
Graduated Air Control

AMERICAN METAL PRODUCTS CORP.
ST. LOUIS, U. S. A.

SARCO
Radiator Traps
Used in New Home of Heating & Ventilating Magazine

For a building of this type, up-to-date in every detail, it was only natural that Sarco Radiator Traps should be chosen because of their many superior advantages.

The movement of the helical corrugated tube in Sarco Traps is so slight that it is hardly detectable. And the movement is distributed over the entire area, instead of being confined to a few points. As a result, the life of the tube and the efficiency of the trap are materially lengthened.

Another feature that adds to the life of this trap is the design which makes it impossible for scale and dirt to collect in the valve.

Sarco Radiator Traps will not air bind, water hammer or freeze.

Other important advantages are explained in our Booklet P-136. Send for a copy.

SARCO CO., Inc.
183 Madison Ave., New York City

Boston Cleveland Philadelphia
Buffalo Detroit Pittsburgh
Chicago St. Louis

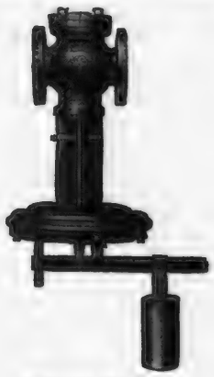
Peacock Bros., Montreal

A Good Heating System

These Three Mason Regulators

are used in many of the largest office buildings and plants over the country. They made money for the contractors who put them in—you will find it profitable to include them in the jobs you are now figuring.

Write for folder giving complete description and prices, or for a copy of Catalog No. 62 which describes the entire line of Mason Regulators.



Mason No. 236

Lever Style Reducing Valve to handle reduced pressure from 0 to 10 pounds or from 5 to 25 pounds.

Mason Standard Reducing Valve

For ranges of reduced pressures from 5 to 50 pounds, 50 to 140 pounds and from 140 to 225 pounds. Where reduced pressure lower than 5 pounds is required, we furnish valve equipped with large diaphragm.

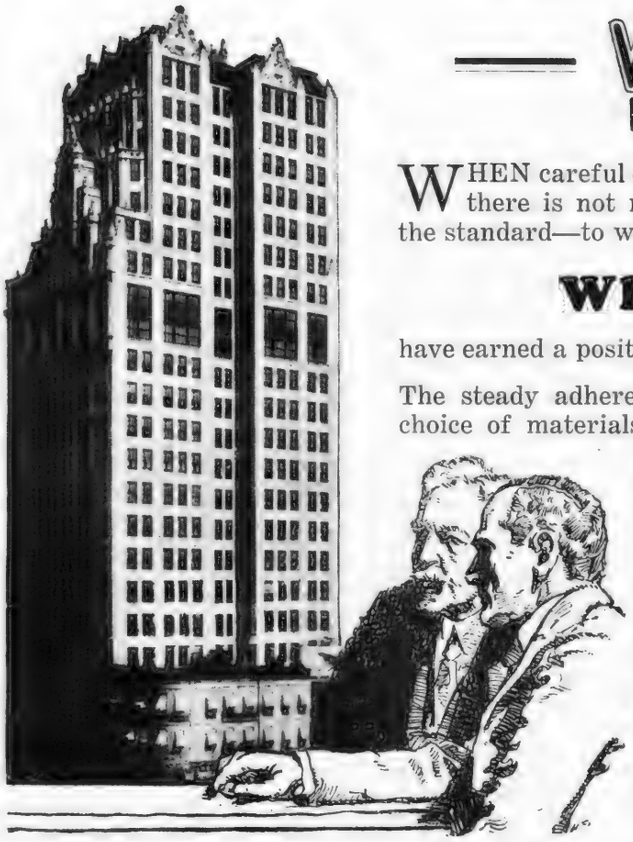
Mason No. 229

For use where initial pressure is below 125 pounds. For ranges of reduced pressures from 1 to 10 pounds, 8 to 35 pounds and 25 to 90 pounds.

Mason Regulators

1811

MASON REGULATOR CO.
BOSTON, MASS.



WHITLOCK HEAT TRANSFER PRODUCTS

WHEN careful engineers are planning an important building, there is not much question as to which service heater is the standard—to which all others are compared.

Whitlock Heaters

have earned a position that is unique—and deservedly.

The steady adherence to a policy of sound engineering, wise choice of materials, careful manufacturing methods, the most particular checking and testing of every detail, and absolute honesty and dependability in all dealings—is bound to merit and receive approval.

Send for a set of Bulletins and Data Sheets covering Whitlock Service Water Heaters and allied products.

THE WHITLOCK COIL PIPE CO.
40 South St., Hartford, Conn.

New York, Boston, Philadelphia, Chicago, Baltimore, Detroit, Los Angeles, San Francisco, and other principal cities. Consult telephone book.

CENTRAL STATION STEAM CO.

2912 East Woodbridge St.
DETROIT, MICHIGAN

MANUFACTURERS OF

Cadillac Condensation Meters
Detroit Feed Water Meters

Packingless Expansion Joints and other special fittings for underground steam distribution mains.

ROSS

Crosshead-GUIDED Expansion Joint Excels in

Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer

ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.

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HOUSE HEATING WITH OIL FUEL

By **P. E. FANSLER,** *Associate Editor, The Heating and Ventilating Magazine*

A representative of one of the largest oil burner manufacturers writes us:

"I have just returned from a trip on the road and find copy of "House Heating With Oil Fuel" which I requested you to mail me here, and I herewith enclose order in payment of same. I have bought all available books published on oil burning during past seven years I have been connected with development work in the field, appointing dealers for oil burners, and there has been nothing yet that approaches this book. Every oil-burner dealer owes it to himself to have a copy. I will advise all of our dealers to get a copy of this book as an absolute essential."

362 PAGES **MORE THAN 150 ILLUSTRATIONS** **PRICE $4.00**

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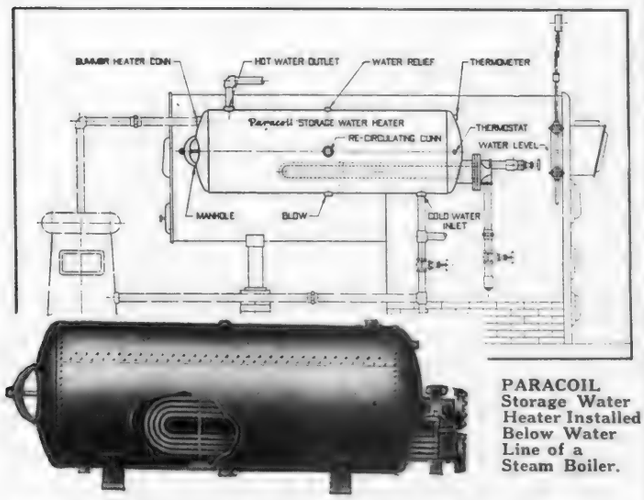
386 FOURTH AVENUE **NEW YORK CITY**



PARACOIL Storage Water Heater Installed Below Water Line of a Steam Boiler.

Hot Water for Large Buildings —the indirect way

There is a marked tendency on the part of heating engineers and architects to specify the use of indirect water heaters in large buildings.

In these large installations the principle of the indirect heater may be utilized to better advantages in the Paracoil Storage Water Heater arranged for installation *below the water line.* Many striking advantages over other systems will result as noted in the list below.

Note These Advantages

- Fuel Saved
- Safety in Operation Increased
- Noiseless in Operation
- Water Hammer Eliminated
- Head Room Saved
- Requires Less Piping— Costs Less
- Automatic Regulation Of Water Temperature
- Can Be Cleaned Without Shutting Down The Boiler Plant

Ordinary steam tube storage water heaters are not suited to below water line service. Special care in designing the length and number of copper tubes to assure the proper heat transfer is necessary. Paracoil Storage Water Heaters are designed with this important point paramount.

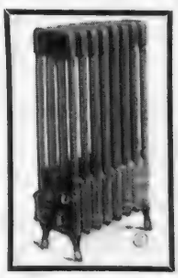
Paracoil Storage Water Heaters are used in many prominent buildings. They are fully guaranteed both as to construction and performance.

Write for booklet "Hot Water for Large Buildings," fully illustrated with diagrams and color chart.

DAVIS ENGINEERING CORP.
90 West St., New York City
Factory: Elizabeth, N. J.

Paracoil
Storage Water Heaters

Clow Gasteam *(unvented)* Heats This Printing Plant As It Should Be Heated



The fact that Clow Gasteam Radiators heat the new printing plant of the Gulf Publishing Company, Houston, Texas, brings to light another type of installation where Gasteam is valuable.

For this plant unvented radiators were used. They provide the humidity so necessary for the proper printing and handling of paper stocks.

In addition, this flexible heat is an economy. For at night, when only the press room needs heat, only that part need be heated. The office radiators are not used.

And jobs like this are just one type of the many that are "going Gasteam." Every heating man should have his share.

Heating contractors find our catalog interesting and profitable. It illustrates the application of Clow Gasteam to every job, in every part of the country.

JAMES B. CLOW & SONS
201-299 No. Talman Ave., CHICAGO

CLOW GASTEAM

Announcing the

LOVEKIN TEMPERATURE CONTROLLED SAFETY VALVES

for storage type gas water heaters

A complete line of emergency gas shut off valves and automatic safety pilot valves for all makes of storage heaters, automatic and non-automatic.

Absolutely new. Thoroughly tested and approved

These valves are temperature controlled and give positive protection against boiler explosion or damage to plumbing fixtures and water meters due to excessively high water temperatures.

Gas is shut off when water reaches 212° or other predetermined temperature and no water or steam leaves the boiler.

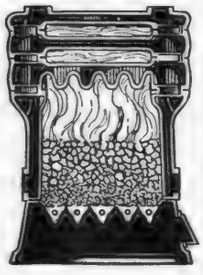
Complete information on request

Manufactured exclusively by **SCHUTTE & KOERTING CO.,** Gas Appliances Division **1153 Thompson St., Philadelphia, Pa.**

A Winning Cards In Every Pack

Burnham Boilers

for Every Heating Purpose



Your Ace of Diamonds Is

Burnham Round Sectional

BECAUSE—

Its extra long fire travel takes the trick every time, in the game of getting fuel thrift for your customers.

Like other aces, if you don't have it to play at a pinch, someone else is going to score on you. Unlike other aces, you can deal this one into your own hand, if you will.

Write for Catalog 67.

Burnham Boiler Corporation

IRVINGTON, N. Y.

Representatives in all principal cities of the United States and Canada.

Blake Cast Iron or Brass Water Heaters

Nothing to Compare With These Either in Price or Efficiency

K-1320 K-1325 K-1330 K-1335 Cross Section

Made to fit any size Boiler or Furnace. Heating surface one foot. Will carry 35 ft. of Radiation. Most suitable Water Back for 30 or 40 gallon Range Boiler.

Brass Cleanout at Bottom for Blowing out Sediment.

Fig. K 1320—Lengthened out for any Holes in Boiler. Fig. K 1325—2½" Centers—K 1330—2" Centers. K 1335—9" Centers.

Tappings ¾ or 1 inch—Measurement 2¼x3¼x12. Weighs about 8½ lbs.

Your Jobber Will Furnish Them

BLAKE SPECIALTY CO.

ROCK ISLAND, ILL.

View of the Wainwright vertical heater with shell cut away to show tube plates and floating head. This heater is supplied with either corrugated or smooth tubes; depending upon the service desired.

Your Hot Water Supply—

can be economically furnished with the Wainwright service heater. Either exhaust or live steam can be used for heating the water. When required, the heater can be furnished with sufficient capacity to heat water within five degrees of the temperature of the steam that is available.

These heaters are made for any capacity or temperature range. They are being widely used in hotels, apartment houses, office buildings, industrial plants and other institutions requiring a constant or intermittent supply of hot water.

Bulletin 54 describing these heaters, sent upon request.

FOSTER WHEELER CORPORATION

165 BROADWAY, NEW YORK, N. Y.

Branches in Principal Cities

Foreign Associates:
Power Specialty Co., Ltd., London, England.
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AERO UNIT COAL PULVERIZERS
AIR HEATERS CENTRIFUGAL PUMPS
CONDENSERS COOLING TOWERS
ECONOMIZERS EVAPORATORS
EXPANSION JOINTS FEED WATER HEATERS

FOSTER WHEELER

FRACTIONATING TOWERS HEAT EXCHANGERS
STEAM JET AIR PUMPS SUPERHEATERS
TUBE STILLS VACUUM PUMPS
WATER COOLED FURNACE SURFACES
BRASS AND COPPER TUBING AND PIPE

"With approximately 50,000 feet of radiation on the two 10" valves—the estimated saving during the night cycle is about 50,000 pounds of steam."

Hornung "Master Control Valve" motor operated directly by thermostat. All relays eliminated. Sizes to 10" inclusive.

THE above is an excerpt from a letter recently received concerning performance of some of our "Master Control Valves." Another interesting statement made of an installation is as follows:

> "The savings effected are such that they have paid for about 35% of the cost of installation to date, that is, from September first to January first."

A Hornung "Master Control Valve" will stop heat waste, keep customers satisfied— and give you more steam to use elsewhere without any extra cost.

Some of the largest plants in the country have stopped heat waste by adopting the Hornung "Master Control Valve." Full details are given in our special bulletin, sent free on request.

HEAT LOST IS MONEY LOST

CENTRAL HEAT APPLIANCES

J. C. HORNUNG
Engineer

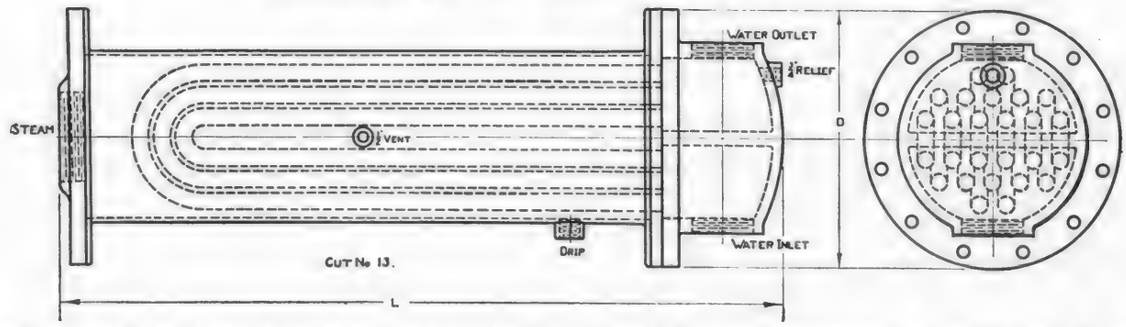
343 S. Dearborn St., Chicago, Ill.

(3621)

NATIONAL

PREHEATERS or U BEND TYPE Condensation Coolers

soon pay for themselves in saving heat lost through discharge of heating systems



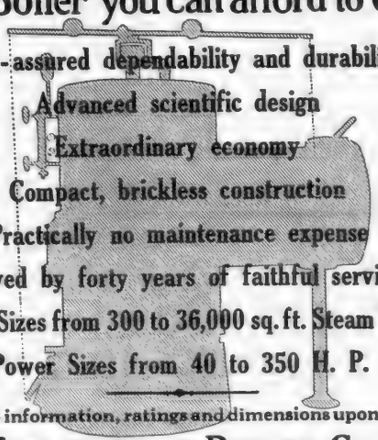
Much heat is lost in allowing the condensation discharge from the heat you buy to pass off into the sewer. By using a National Preheater or Condensation Cooler, the condensation passes through the heater where the U bend element extracts the heat still in the condensation and uses it for domestic hot water supply. You also eliminate trouble resulting from high temperature condensation emptying into the sewage system.

Furnished in All Sizes. Write for Quotations.

THE NATIONAL PIPE BENDING CO.

120 River Street, New Haven, Conn. Boston—New York—Philadelphia

FITZGIBBONS STEEL BOILERS
"The Boiler you can afford to own"



Steel-assured dependability and durability

Advanced scientific design

Extraordinary economy

Compact, brickless construction

Practically no maintenance expense

Proved by forty years of faithful service

Heating Sizes from 300 to 36,000 sq. ft. Steam Rating

Power Sizes from 40 to 350 H. P.

Complete information, ratings and dimensions upon request

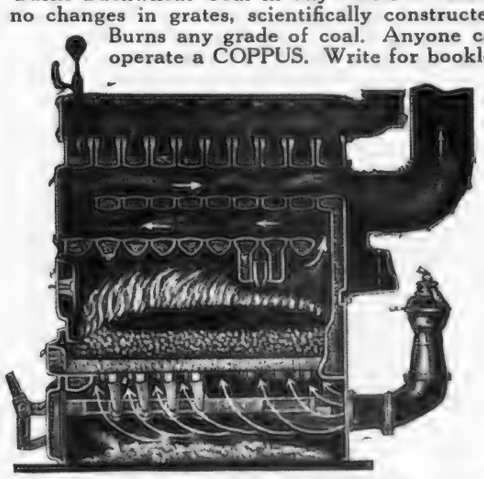
FITZGIBBONS BOILER CO.
INCORPORATED
570 Seventh Ave., New York, N. Y.

COAL BILLS CUT ONE-HALF

WITH THE REGISTERED COPPUS U.S. PAT. OFFICE

UNDER-GRATE DRAFT BLOWER

For all classes of heating plants in Homes, Schools, Churches, Office and Public Buildings, Apartments, etc. Burns Buckwheat Coal in any boiler or heater with no changes in grates, scientifically constructed. Burns any grade of coal. Anyone can operate a COPPUS. Write for booklet.



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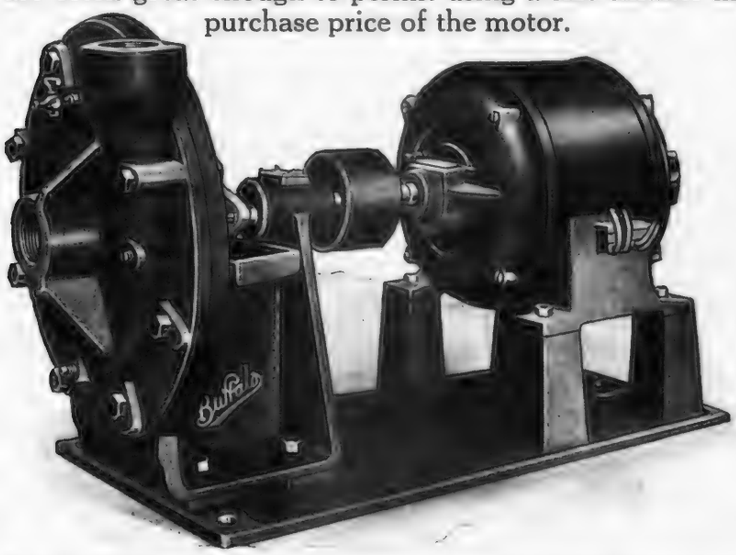
Sole Distributors in United States and Canada.
BRIDGEPORT, CONN.

A New Pump Value

New in performance—New in efficiency—New in its price class! But not new in the sense of being experimental. It has been subjected to the most severe testing. Definite performance curves and rating tables have been established.

Efficiencies are far higher than those now accepted as standard pumps of this type. Differences are often great enough to permit using a size smaller motor, saving not alone in power but in the purchase price of the motor.



Outstanding Features of the Class "CH"

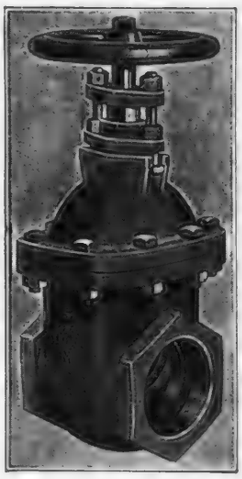
1. High efficiency.
2. Superior performance with open impellers, for gritty, lumpy or viscous liquids.
3. Eight different positions of discharge.
4. "Buffalo" combined pulley-coupling (patent applied for).
5. Ring-oiling bearing next to pulley-coupling.
6. A price which makes it one of the greatest pump values ever offered.

Buffalo Steam Pump Co.

480 Broadway, Buffalo, N. Y.

In Canada—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

IRON BODY GATE VALVES



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NON-RISING STEM
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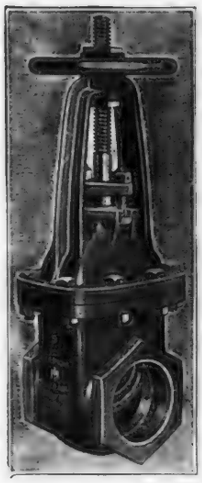
ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings



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Johnson Fan & Blower Co., Chicago, Ill.
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Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
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Frost Mfg. Co., Galesburg, Ill.
Leader Iron Works, Decatur, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

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Bryan Steam Corp., Peru, Ind.
Burnham Boiler Co., Irvington, N. Y.
Coatesville Boiler Works, Coatesville, Pa.
Fitzgibbons Boiler Co., Inc., New York.
Freeman Mfg. Co., Racine, Wis.
Frost Mfg. Co., Galesburg, Ill.
Gorton Heating Corporation, New York.
Heggie-Simplex Boiler Co., Joliet, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Molby Boiler Co., New York.
Monitor Boiler Co., Philadelphia, Pa.
National Radiator Corp., Johnstown, Pa.
Newport Boiler Co., Chicago, Ill.
Orr & Sembower, Inc., Reading, Pa.
Pacific Steel Boilers Corp., Waukegan, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Spencer Heater Co., Williamsport, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Thatcher Co., The, Newark, N. J.
Titusville Iron Works Co., The, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.

BOILERS, MAGAZINE FEED
Gorton Heating Corporation, New York.
Molby Boiler Co., New York.
Newport Boiler Co., Chicago, Ill.
Spencer Heater Co., Williamsport, Pa.

BOILERS, OIL-FIRED
Bryan Steam Corp., Peru, Ind.
Johnston Brothers, Inc., Ferrysburg, Mich.
Leader Iron Works, Decatur, Ill.

BOILERS, POWER
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Heggie-Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Orr & Sembower, Inc., Reading, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

CALORIMETERS
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

COILS, PIPE
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Heat Transfer Products, Inc., New York
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

CONDENSERS
Davis Engineering Corp., New York.
Foster Wheeler Corporation, Carteret, N. J.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

CONVERTERS, HOT WATER
Davis Engineering Corp., New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

COOLERS, AIR
Alberger Heater Co., Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.

COOLERS, OIL
Davis Engineering Corp., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Whitlock Coil Pipe Co., Hartford, Conn.

COOLING TOWERS & PONDS
Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

COPPER BOILERS
Badger & Sons Co., E. B., Boston, Mass.

COPPER KETTLES
Badger & Sons Co., E. B., Boston, Mass.

COVERING, BOILER, PIPE, ETC.
American District Steam Co., North Tonawanda, N. Y.
Banner Rock Products Co., Alexandria, Ind.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

DAMPERS, DUCT
American Foundry & Furnace Co., Bloomington, Ill.
Buckeye Blower Co., The, Columbus, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Pecco, Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

DEHUMIDIFYING APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

DISTILLERS, (WATER)
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

DRAFT APPLIANCES
International Fuel Service Corp., Bridgeport, Conn.

DRYING SYSTEMS
(See Air Cooling & Drying Systems).

DUST COLLECTING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa.
Pecco, Inc., St. Louis, Mo.
Reed Air Filter Co., Inc., Louisville, Ky.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

DUST COLLECTORS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

ENGINES, STEAM, AUTOMATIC
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

ENGINES, STEAM, HIGH SPEED
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass

EQUALIZING LOOPS
Hoffman Specialty Co., New York.
Sarco Co., Inc., New York.

EVAPORATORS, BOILER FEED MAKE-UP
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

EXHAUST HEADS
Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Swartwout Co., The, Cleveland, Ohio.

EXHAUST SYSTEMS
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EXHAUST SYSTEMS, ACID
Duriron Company, Inc., The, Dayton, O.

EXPANSION JOINTS
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Foster Wheeler Corporation, Carteret, N. J.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

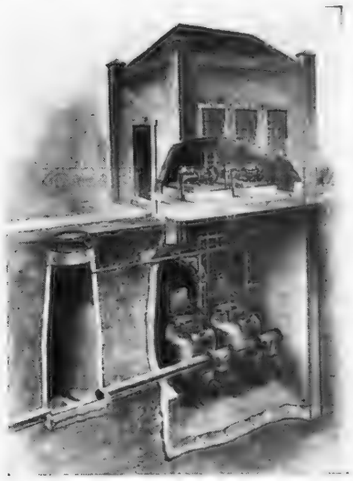
FANS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

FANS, DISC PRESSURE
DeBothezat Impeller Co., Inc., New York.
Garden City Fan Co., Chicago, Ill.

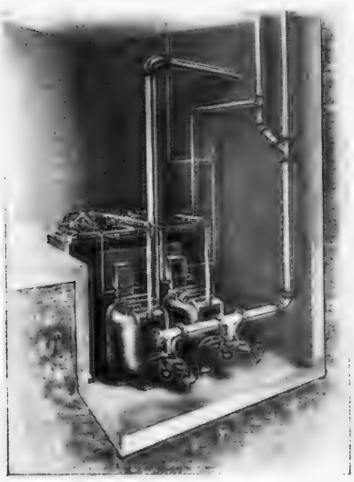
FANS, SUPPLY AND EXHAUST
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Emerson Electric Mfg. Co., St. Louis, Mo.
Garden City Fan Co., Chicago, Ill.
Johnson Fan & Blower Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.

FEEDERS, BOILER
Cashin Co., W. D., Boston, Mass.
Cissell Mfg. Co., W. M., Louisville, Ky
Connor Co., Inc., The W. B., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

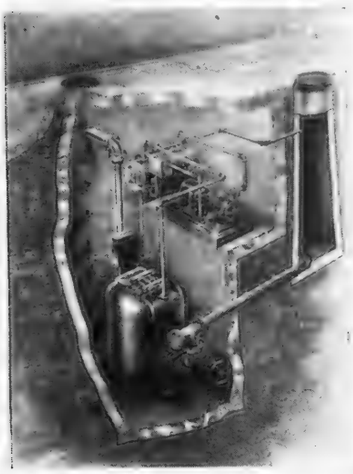
No intricate air valves in these sewage plants



A duplex installation. Widely used in municipal work for pumping sewage from low areas into gravity sewer.



Installation for office building, apartment house, hotel or hospital. Discharge is into street sewer.



Underground installation for municipal work.

Throughout the Jennings Sewage Ejector you will notice a simplicity and sturdiness in construction that make possible two outstanding advantages in pneumatic equipment of this kind—trustworthy performance, at the the least cost.

Intricate air valves and similar complicated mechanisms have been avoided. There are no inaccessible parts. Nor any devices likely to get out of order and require attention.

Let us send you further details before you lay out your next sewage ejector plant.

NASH ENGINEERING COMPANY

81 WILSON ROAD SO. NORWALK, CONN.

Branch Sales Offices: Atlanta, Birmingham, Boston, Buffalo, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Los Angeles, Louisville, Memphis, Miami, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Washington, D. C. **In Canada:** Montreal, Toronto, and Vancouver. **European Offices:** London, Eng., Norman Eng., Co.; Brussels, Belgium and Amsterdam, Holland, Louis Reijners & Co.; Oslo, Norway, and Stockholm, Sweden, Lorentzen & Wettre.

Jennings Pumps

Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

FILTERS, (AERATING)
Davis Engineering Corp., New York.

FILTERS, FEED-WATER
Davis Engineering Corp., New York.

FITTINGS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

FITTINGS, DISTRIBUTOR
Blake Specialty Co., Rock Island, Ill.

FITTINGS, FLANGED
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Walworth Co., New York

FLANGES
Clow & Sons, James B., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Walworth Co., New York

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

GASKETS, ASBESTOS
Jenkins Bros., New York.
Johns-Manville Corp., New York.

GASKETS, METALLIC
Jenkins Bros., New York.

GASKETS, RUBBER
Jenkins Bros., New York.

GAUGE BOARDS
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Clow & Sons, James B., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGE GLASSES
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.

GAUGES, ALTITUDE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
United States Radiator Corp., Detroit, Mich.

GAUGES, DRAFT
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGES, HYDRAULIC
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

GAUGES, OUNCE GRADUATED
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

GAUGES, PRESSURE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

GAUGES, VACUUM
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

GAUGES, VACUUM (COMPOUND)
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

GAUGES, WATER
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

GENERATOR COOLING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Reed Air Filter Co., Inc., Louisville, Ky.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

GOVERNORS, (PUMP)
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Webster & Co., Warren, Camden, N. J.

GRATES, DUMPING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio
Titusville Iron Works Co., The, Titusville, Pa

GRATES, ROCKING
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

GRATES, SHAKING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING AND DUMPING
Frost Mfg. Co., Galesburg, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING, CIRCULAR
Fitzgibbons Boiler Co., Inc., New York.
Pyramid Iron Products Corp., New York.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, STATIONARY
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRILLES
American Foundry & Furnace Co., Bloomington, Ill.
Metalace Corporation, Boston, Mass.

HEAT CABINETS
Clow & Sons, James B., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Metal Stamping Co., Long Island City.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

HEATERS, AIR, FAN SYSTEM
Aerofin Corp., Newark, N. J.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
Johnson Fan & Blower Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

HEATERS, DOMESTIC WATER
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Blake Specialty Co., Rock Island, Ill.
Davis Engineering Corp., New York.
Exceiso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Molby Boiler Co., New York.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., The, Erie, Pa.
Taco Heaters, Inc., New York.
Thatcher Co., The, Newark, N. J.
Titusville Iron Works Co., The, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, ELECTRICAL UNIT
American Blower Co., Detroit, Mich.
Johnson Fan & Blower Co., Chicago, Ill.

HEATERS, FEED WATER, (CLOSED)
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, Carteret, N. J.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, FEED WATER, (OPEN)
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Webster & Co., Warren, Camden, N. J.

HEATERS, FUEL-OIL
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Electrol, Inc., St. Louis, Mo.
Exceiso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Air Filter Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Taco Heaters, Inc., New York.
Titusville Iron Works Co., The, Titusville, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, UNIT
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
Johnson Fan & Blower Co., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

HEATING SYSTEMS, GAS
Clow & Sons, James B., Chicago, Ill.

HEATING SYSTEMS, VACUUM
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, VAPOR
American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, WATER
American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Grinnell Co., Providence, R. I.
Hornung, J. C., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Spencer Heater Co., Williamsport, Pa.
Thatcher Co., The, Newark, N. J.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
York Heating & Ventilating Corp., Phila., Pa.

HUMIDITY CONTROL
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.

INSTRUMENTS, ELECTRIC MEASURING
Bristol Co., The, Waterbury, Conn.

INSTRUMENTS, INDICATING AND RECORDING
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
American Temperature Indicating Co., Toledo, Ohio.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

INSULATION, BOILER, PIPE, ETC.
(See Covering, Boiler, Pipe, etc.)

INSULATION, BUILDING
Banner Rock Products Co., Alexandria, Ind.
Flax-li-num Insulating Co., St. Paul, Minn.
Insulite Co., Minneapolis, Minn.
Johns-Manville Corp., New York.

MANOMETERS
American Blower Co., Detroit, Mich.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.

"The CONDO-VAC"

FOR EIGHTEEN YEARS the Chicago Pump Company has been active in developing centrifugal pumping equipment to meet the every need of the Building Industry.

An undisputed leadership in the Building Field has been the inevitable result of this constant effort.

It is necessary, then, that when the Chicago Pump Company presents to the Building Industry a new pump—it must be of a quality and efficiency that will be a credit to the standing of its maker.

It is under these circumstances that the Chicago Pump Company introduces the new "Condo-Vac"—a splendid vacuum pump and a fine piece of machinery.

Write for Bulletin 137.

1—The "Condo-Vac" has a *centrifugal* air pump. It is simple, positive and quiet.

2—The "Condo-Vac" is horizontally split, making it easily accessible.

3—The "Condo-Vac" has a low return inlet. On the 8000-foot size it is only ten inches from the floor.

4—The "Condo-Vac" has a combination receiver and base and takes very little space.

CHICAGO PUMP COMPANY

SEWAGE-CONDENSATION-CIRCULATING
BILGE-FIRE-HOUSE-VACUUM

2336 Wolfram Street, Chicago 1 Madison Avenue, New York

MECHANICAL DRAFT APPARATUS

American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Garden City Fan Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
New York Blower Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

METALS, THERMOSTATIC

Chace Valve Co., W. M., Detroit, Mich.

METERS, CONDENSATION

American District Steam Co., North Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.

METERS, FEED WATER

Central Station Steam Co., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

METERS, FLOW

Foxboro Co., Inc., The, Foxboro, Mass.
Spray Engineering Co., Boston, Mass.

METERS, PITOT TUBE

American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.

METERS, STEAM

American District Steam Co., North Tonawanda, N. Y.

MOTORS (ELECTRIC)

Century Electric Co., St. Louis, Mo.
Emerson Electric Mfg. Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Lincoln Electric Co., Cleveland, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

NOZZLES, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

NOZZLES, SPRAY

American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

OIL BURNERS

American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Cleveland Steel Products Corp., Cleveland, Ohio
Eisler Engineering Co., Newark, N. J.
Electrol, Inc., St. Louis, Mo.
Gulf Oil Burner Co., Philadelphia, Pa.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
Laco Gas Burner Co., Griswold, Iowa.
McIlvaine Burner Corporation, Chicago, Ill.
Nu-Way Corporation, Rock Island, Ill.
Pascoe Company, The Wm. H., Chicago, Ill.
Petroleum Heat & Power Co., New York.
Preferred Oil Burners, Inc., Peoria, Ill.
Sundstrand Engineering Co., Rockford, Ill.
Winslow Boiler & Engineering Co., Chicago, Ill.

OIL BURNER EQUIPMENT

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Cook Electric Co., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Monroe Machine Tool Co., Chicago, Ill.
Preferred Utilities Mfg. Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster Electric Co., Racine, Wis.

OIL BURNER IGNITION AND CONTROL EQUIPMENT

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Webster Electric Co., Racine, Wis.

PIPE, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

PIPE, CAST IRON

Clow & Sons, James B., Chicago, Ill.

PIPE, STEEL

Clow & Sons, James B., Chicago, Ill.
National Tube Co., Pittsburgh, Pa.

PIPE, WOOD

Wyckoff & Son Co., A., Elmira, N. Y.

PIPE BENDING

Badger & Sons Co., E. B., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (WOOD)

American District Steam Co., North Tonawanda, N. Y.
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE HANGERS

Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Walworth Co., New York

PIPE THREADING & CUTTING MACHINES

National Pipe Bending Co., New Haven, Conn.

PRESSURE REDUCING VALVES

(See Regulators, Pressure).

PULLEYS, VARIABLE SPEED

Horton Mfg. Co., Minneapolis, Minn.

PUMPS, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

PUMPS, CENTRIFUGAL

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, Carteret, N. J.
Monroe Machine Tool Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Trane Co., The, LaCrosse, Wis.

PUMPS, CENTRIFUGAL, VACUUM HEATING

Ames Pump Co., New York.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

PUMPS, CONDENSATION

American Steam Pump Co., Battle Creek, Mich.
Ames Pump Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

PUMPS, OIL

Connor Co., Inc., The W. B., New York.
Monroe Machine Tool Co., Chicago, Ill.

PUMPS, RECIPROCATING STEAM

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.

PUMPS, TURBINE

Chicago Pump Co., Chicago, Ill.
Foster Wheeler Corporation, Carteret, N. J.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, VACUUM

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Monroe Machine Tool Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

RADIATOR ENCLOSURES OR SHIELDS

Acme Radiator Shield Co., Cincinnati, Ohio.
American Metal Products Corp., St. Louis, Mo.

RADIATOR HANGERS

American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., St. Paul, Minn.
Kewanee Boiler Corp., Kewanee, Ill.
McAlear Mfg. Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.

RADIATORS, BRASS

Rome Brass Radiator Corp., New York.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.

RADIATORS, GAS HEATED

Clow & Sons, James B., Chicago, Ill.

RADIATORS, STEAM & WATER

American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Molby Boiler Co., New York.
National Radiator Corp., Johnstown, Pa.
Nelson Corp., Herman, The, Moline, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Thatcher Co., The, Newark, N. J.
United States Radiator Corp., Detroit, Mich.

RECEIVERS, AIR

Brownell Co., The, Dayton, Ohio.
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

RECEIVERS, CONDENSATION

American District Steam Co., North Tonawanda, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

REGULATORS, BOILER-FEED

Atlas Valve Co., Newark, N. J.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

REGULATORS, DAMPER

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Atlas Valve Co., Newark, N. J.
Breese Engineering Corp., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Regulator Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

REGULATORS, PRESSURE

American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Teeple Co., L. R., Portland, Oregon

REGULATORS, TEMPERATURE

(See Temperature Control).

SEPARATORS, OIL

Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster & Co., Warren, Camden, N. J.

SEPARATORS, STEAM

American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Swartwout Co., The, Cleveland, Ohio.
Webster & Co., Warren, Camden, N. J.

SPRAY COOLING SYSTEMS

Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Seymour, James M., Newark, N. J.

SPRAY NOZZLES

(See Nozzles, Spray).

STRAINERS, OIL

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Monroe Machine Tool Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

STRAINERS, STEAM

American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

STRAINERS, WATER

Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

TEMPERATURE CONTROL

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mercoid Corporation, Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Raymond, F. I., River Forest, Ill.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Teeple Co., L. R., Portland, Oregon
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

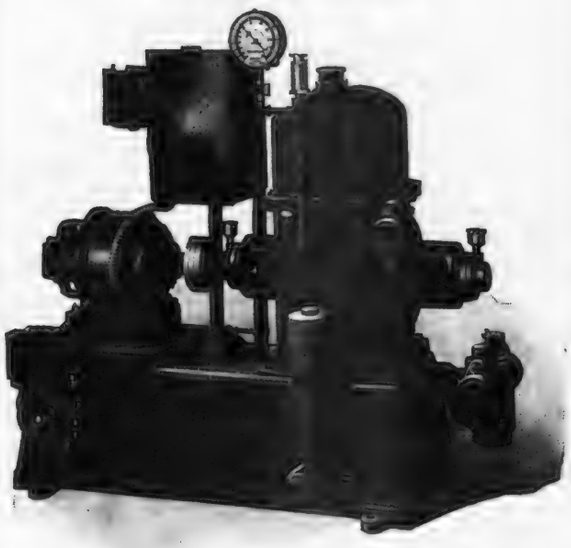
THERMOMETERS, RECORDING & INDICATING

American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
American Temperature Indicating Co., Toledo, Ohio.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.

SKIDMORE

Return Line Vacuum and Boiler Feed Pump

Maintained Efficiency, Minimum Floor Space, Low Power Consumption, No Close Clearances



The Skidmore pump operates on a different principle, air and water are both handled by the suction rotor (an exclusive feature) the air being separated on the discharge or atmospheric side.

Owing to this method of operation, the centrifugal or boiler feed pump receives its water under atmospheric pressure.

The unit is self-contained, ball bearing, operated by one motor.

The automatic unit is mounted on interceptor base in which a float switch is installed. This construction gives extremely low float control. The operating point being 10″ on 5,000, 8,000, and 16,000 foot units and 12″ on the larger sizes.

Automatic units are shipped from the factory with all electrical equipment mounted and wired.

Bulletin No. 5 illustrating this unit is now available.

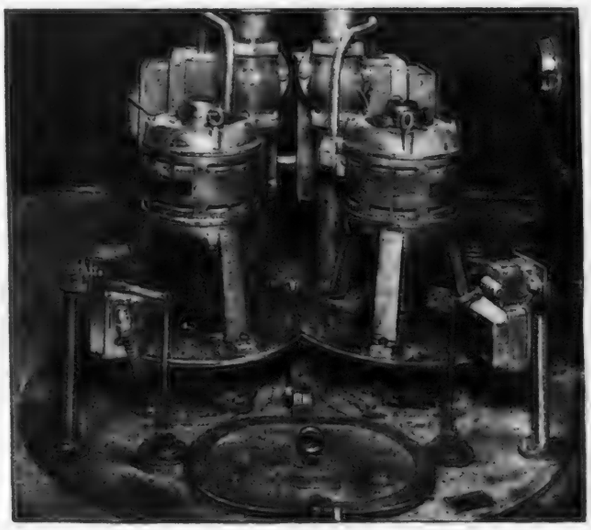
SKIDMORE CORPORATION

General Offices and Factory

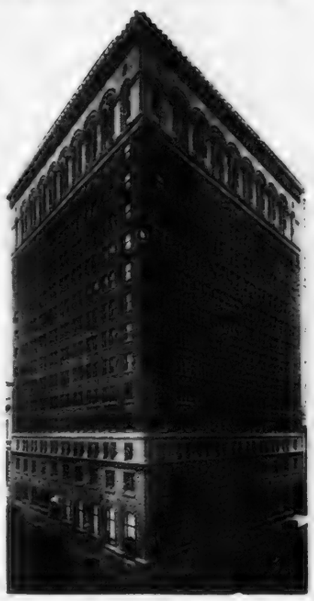
1535 Dayton St. CHICAGO, U. S. A.

Representatives in principal cities

Canadian Representatives, Darling Bros., Limited
120 Prince Street, Montreal



Sewage and Drainage Pumps



Fred. W. Meyer, *Architect*
Leland & Hayley, *Consulting Engineers*

THE American-Marsh Duplex Electric Automatic Sewage Ejector shown above is installed in this modern building at right, the Financial Center Building, San Francisco. Like thousands of other American-Marsh sewage and drainage pumps, it is the unfailing safeguard against a flooded basement and heavy loss.

When you have any type of problem involving the pumping of sewage or drainage or the handling of other heavy liquids, you can place utmost confidence in this American-Marsh equipment. It is extra sturdy, extra simple in design, and is furnished with control apparatus entirely automatic and of dependable character. In the line is a size of pump for every requirement.

Now or at any future time we will be glad to submit a detailed recommendation and cost estimate covering your particular problem.

Write for new Bulletin 41 giving complete specifications and performance ratings.

AMERICAN-MARSH

AMERICAN STEAM PUMP COMPANY
BATTLE CREEK, MICHIGAN

Pumping Equipment

Powers Regulator Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.

THERMOSTATS

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Johnson Service Co., Milwaukee, Wis.
Mercoid Corporation, Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

TRAPS, BUCKET

Swartwout Co., The, Cleveland, Ohio.

TRAPS, FLOAT

Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Sarco Co., Inc., New York.
Swartwout Co., The, Cleveland, Ohio.

TRAPS, INVERTED BUCKET (STEAM AND AIR)

Armstrong Machine Works, Three Rivers, Mich.

TRAPS, LIFTING

Lytton Mfg. Corp., Franklin, Va.
Swartwout Co., The, Cleveland, Ohio.

TRAPS, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
Armstrong Machine Works, Three Rivers, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville Corp., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

TRAPS, RETURN

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Swartwout Co., The, Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TRAPS, STEAM

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Davis Engineering Corp., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.

TRAPS, VACUUM

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Swartwout Co., The, Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TUBING, COPPER AND BRASS

Wolverine Tube Co., Detroit, Mich.

TURBINES, STEAM

Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

TURBO-BLOWERS

Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Garden City Fan Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

UNDERGROUND PIPE CONDUITS

American District Steam Co., North Tonawanda, N. Y.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

VACUUM CLEANING APPARATUS

American Radiator Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VALVES, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

VALVES, AIR, AUTOMATIC

American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Kelly Brass Works, Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A., New York.
United States Radiator Corp., Detroit, Mich.

VALVES, AIR RELIEF

American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Gorton Heating Corporation, New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Trane Co., The, LaCrosse, Wis.

VALVES, BACK PRESSURE

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, BALANCED

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, BLOW-OFF

Jenkins Bros., New York.
Lytton Mfg. Corp., Franklin, Va.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

VALVES, CHECK

Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Milwaukee Valve Co., Milwaukee, Wis.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

VALVES, FLOAT

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, GATE

American District Steam Co., North Tonawanda, N. Y.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

VALVES, GLOBE, ANGLE & CROSS

Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Phila., Pa.
Walworth Co., New York.

VALVES, HYDRAULIC-OPERATING

Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Walworth Co., New York

VALVES, MAGNETIC

Absolute Con-Tac-Tor Corp., Elkhart, Ind.

VALVES, NON-RETURN

Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Capitol Brass Works, Detroit, Mich.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich
Vapor Engineering Co., New York.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

VALVES, REDUCING

(See Regulators, Pressure).

VALVES, REGULATING

Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Walworth Co., New York

VALVES, RELIEF (WATER)

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.
Walworth Co., New York

VALVES, SAFETY

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
National Radiator Corp., Johnstown, Pa.
United States Radiator Corp., Detroit, Mich.
Walworth Co., New York

VALVES, STOP AND CHECK

(See Valves, Non-Return).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
American Radiator Co., Buffalo, N. Y.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Johnson Fan & Blower Co., Chicago, Ill.
Lakeside Company, The, Hermansville, Mich.
Nelson Corp., Herman, The, Moline, Ill.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park Boston, Mass.
Typhoon Fan Co., New York.

VENTILATING SYSTEMS, ACID

Duriron Company, Inc., The, Dayton, O.

VENTILATORS

American Foundry & Furnace Co., Bloomington, Ill.
Bayley Blower Co., Milwaukee, Wis.
DeBothezat Impeller Co., Inc., New York
Midwest Air Filters, Inc., Bradford, Pa.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park Boston, Mass.

VENTILATORS, MUSHROOM

Aeolus Dickinson Co., Chicago, Ill.
American Blower Co., Detroit, Mich.
American Foundry & Furnace Co., Bloomington, Ill.
American Metal Products Corp., St Louis, Mo.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowles Mushroom Ventilator Co., New York.
Ventilating Products Co., Chicago, Ill

VENTILATORS, ROOF

Aeolus Dickinson Co., Chicago, Ill
American Foundry & Furnace Co., Bloomington, Ill.

VENTILATORS, UNIT

American Blower Co., Detroit, Mich
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
DeBothezat Impeller Co., Inc., New York
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., New York.
Sturtevant Co., B. F., Hyde Park Boston, Mass.

WATER STERILIZERS

Clow & Sons, James B., Chicago, Ill

WEATHER STRIPS, METAL

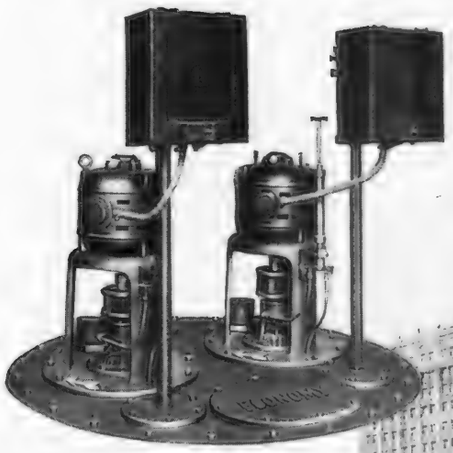
Athey Co., Chicago, Ill.

WELDERS, ELECTRIC ARC

Lincoln Electric Co., Cleveland, Ohio

WRENCHES, STILLSON

Walworth Co., New York.



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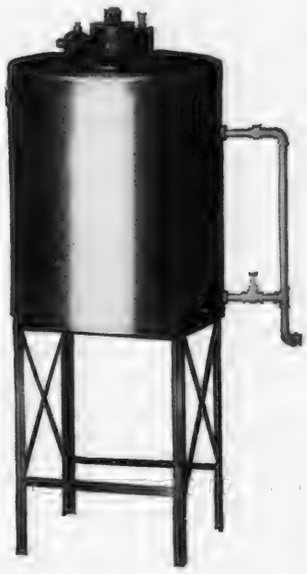

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Like the Flow of Oil

Monroe Features

- Quiet Operation
- Extra-Large Brass Float
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- Janette Motor
- Carbon Contact Switch
- Self-Priming
- Attractive Finish
- Heavy Construction

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556-58 W. Monroe St., Chicago, Ill.

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Company .....
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City ..... State .....

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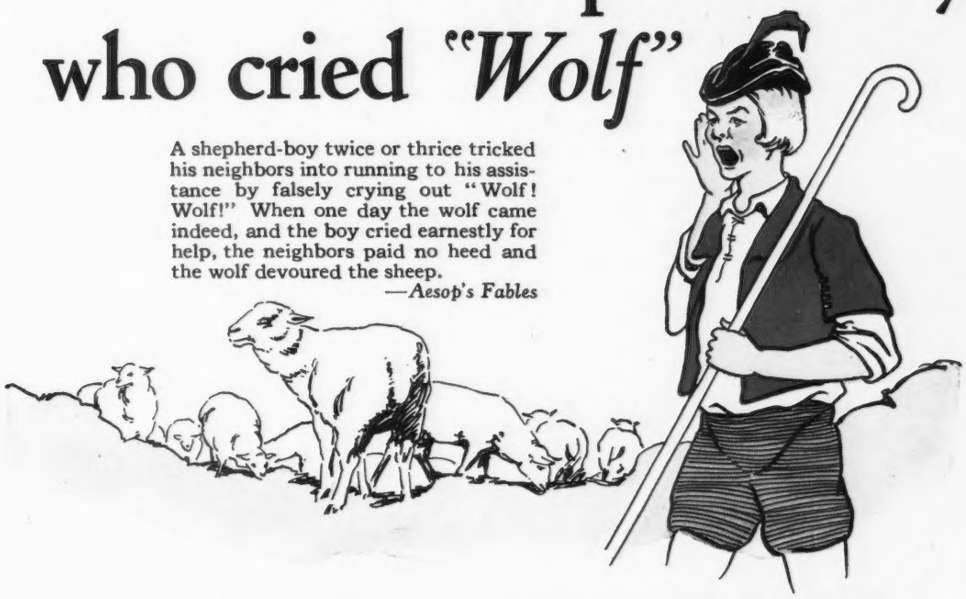
—*Aesop's Fables*



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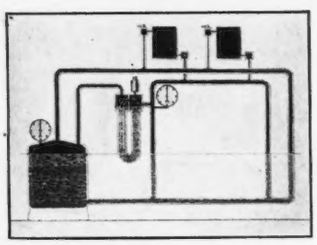

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